Smithsonian

April 1997

THE GREENING OF THE GREENS
Golf is finally letting nature take its course (p. 56)

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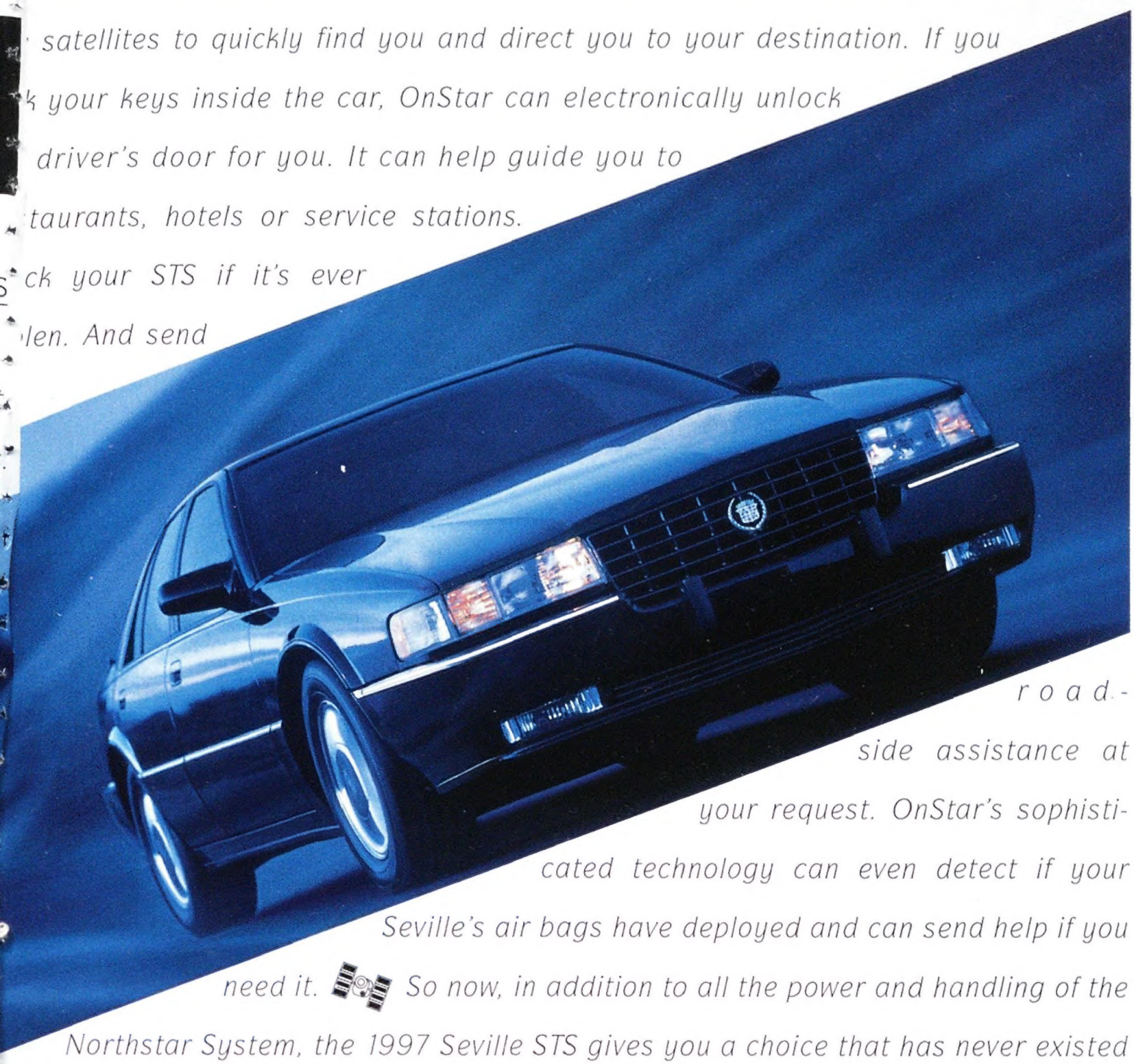

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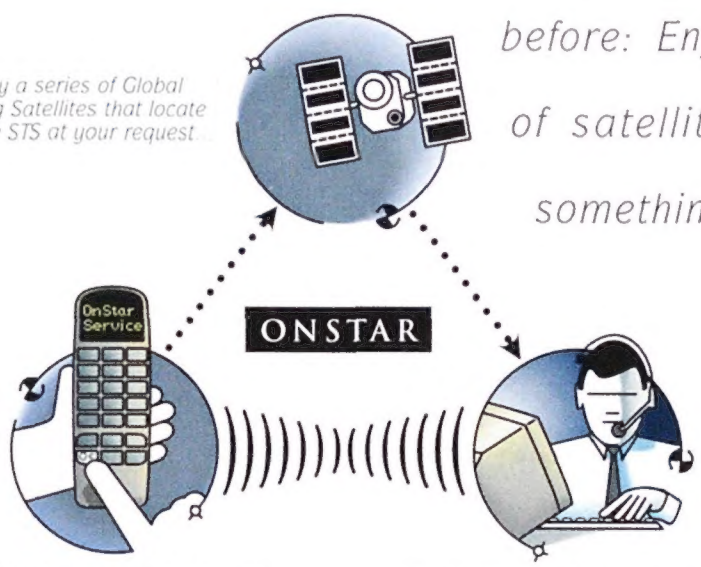

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Smithsonian *departments*

April 1997
Volume 28, Number 1

Cover

Cover:
A golfer chips from the rough on the par-3 third hole at newly built Desert Willow. As designed by Michael Hurdzan, the Palm Desert, California, municipal course has only 80 acres in grass; beyond the rough, native plants (not yet mature) and boulders take over (p. 56)
Photograph by Michael Melford

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Portuguese Blues.

The blues that adorn the white houses of Obidos, 50 miles from Lisbon, are typical examples of local color.
It's a feature beautiful enough to have been the inspiration behind a few songs and not all of them sad.
But the painting is only one example of the area's inspirational beauty.
Flower-laden windows, narrow stone streets, sun-drenched squares and a medieval castle, now a magnificent "Pousada," add color too.
In other regions, such as Alentejo, white-and-blue houses prevail, where they contrast with the wheat-covered plains, the peaceful shade of the holm oak trees and the coolness of olive groves.
Of course, it would be easy for us to go on singing the praises of Portugal.
After a visit you'll be tempted to write a few verses of your own.

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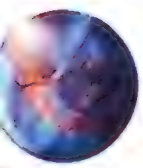

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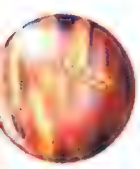

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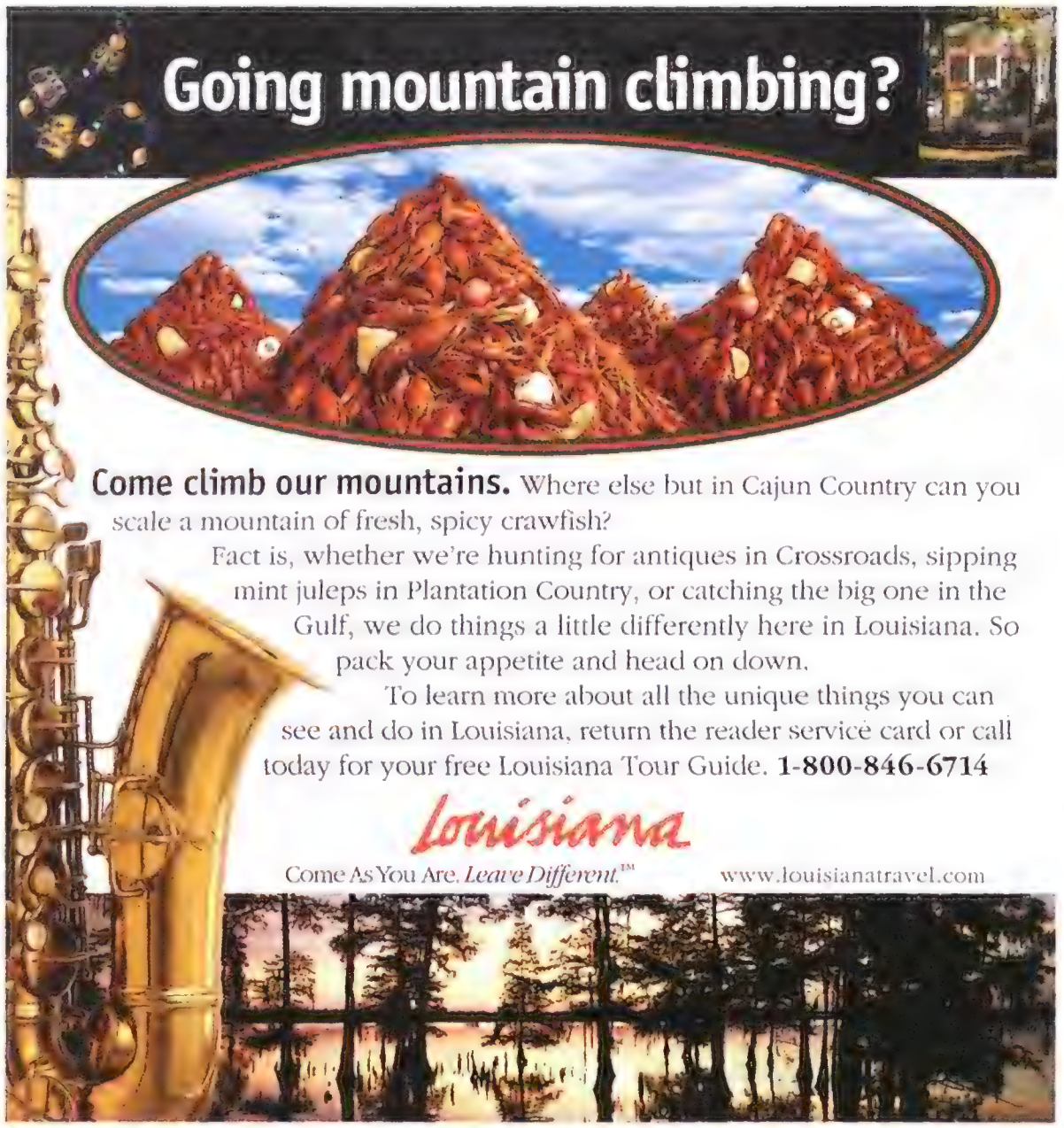
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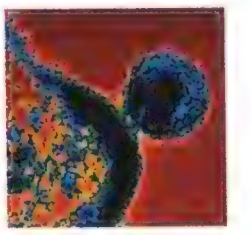
A drug he discovered for transplant patients is now helping millions fight AIDS.

Ken Richardson
pharmaceutical company researcher

"I left high school at age 16 to do odd jobs in a small pharmaceutical lab. Back then I never dreamed that, one day, I would help discover a medicine that would save thousands of lives."

"I loved lab work, so I went back to school at night and worked at the lab during the day. After 12 years, I had my Ph.D. Then I went to work at a pharmaceutical company, where I began research on an anti-fungal medicine to treat deadly infections. For me, a drug saves more than a life. It can save a family."



HIV: The virus that causes AIDS

"Some of the most deadly infections come from fungi in the air we breathe," says Ken Richardson, a pharmaceutical company researcher. "When you have a healthy immune system, it's not a problem."

Richardson and his research team discovered a lifesaving drug in the early 1980s to treat fungal infections in cancer and transplant patients. When thousands of AIDS patients began turning up with fungal infections, they thought their new medicine might help.

"I'll never forget the first time we tried it in an AIDS patient. She was hallucinating from a fungal infection that was damaging her brain," said Richardson. "The doctor gave her our drug and the next day the hallucinations were gone. Two weeks later she left the hospital." Today, the drug Richardson discovered for his company helps millions of people around the world.

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Secretary Heyman's comments

Smithsonian Perspectives

The Smithsonian's gardens and greenery are things of beauty and delight as well as utility

Visitors to the Smithsonian Institution plan their trips in anticipation of viewing the treasures inside our many museums and at the National Zoo. Some of our most significant treasures, however, are in plain view outside the museums—our gardens and plantings. I was surprised by them when I first came to the Smithsonian, and I am forever amazed by their beauty and their importance for the Institution and its visitors.

Most of the 170 acres that surround our Washington, D.C. museums and support centers are accessible to visitors and are managed with the same mission as the rest of the Smithsonian—for the "increase and diffusion of knowledge." To that end, the Institution has worked hard to create several living outdoor exhibitions. The hustle and bustle of Washington, D.C. is all around, but not inside these garden "rooms."

Many of the Smithsonian's staunchest donors have chosen to give to the gardens of the Smithsonian, leaving a legacy of beauty for all. Mrs. S. Dillon Ripley, the late wife of the Smithsonian Institution's eighth Secretary, started the Women's Committee of the Smithsonian Associates in 1966. As an honor to its founder, the Women's Committee funded a garden in Mary Livingston Ripley's name. Located between the Arts and Industries Building and the Hirshhorn Museum, this charming walkway with its 19th-century cast-iron fountain is bordered with plants the year round.

Another generous benefactor, Enid A. Haupt, made possible the splendid garden that bears her name. Ornamenting the south side of the Castle, this miniature park forms a courtyard between five museums and actually rests on the roofs of two of them. It offers the visitor a beautiful stroll from one museum to another, or a chance to savor the surroundings from one of the original or reproduction Victorian benches. The importance of this garden can be seen each day as hundreds of visitors and staff use this serene space.

We increasingly stress collaboration between museum staffs, and some of our best efforts are found in our gardens. The new Smithsonian Butterfly Habitat Garden, which runs the length of 9th Street between Madison Drive and Constitution Avenue, borders the east side of the National Museum of Natural History. A treat for the eye, this garden also teaches visitors about insect-plant interactions that occur in four different habitats or plant communities. The garden was designed using plants that native butterflies need to complete their life cycle. These are grouped in mini-habitats in the hope of attracting a wide assortment of local butterfly species.

It took a special kind of teamwork to design this complex "exhibit." The Smithsonian Horticulture Services Division tapped expertise from the Entomology and Exhibits departments of the National Museum of Natural History to create a synergy that had not existed before. The scientific knowledge needed to establish butterfly and plant lists, the technical expertise of the graphic interpretation designers, and the horticultural proficiency needed to create a living garden were all brought together with superb results.

Another Smithsonian organization that makes extensive use of interdisciplinary cooperation in its horticulture program is the National Zoological Park. Using a diverse selection of plants, the Zoo stresses natural settings and habitat development rather than formal gardens. The horticulture staff grows its own plants to enhance the environment for animals and visitors, as well as to feed the animals. For example, the Zoo grows 70 species of bamboo to provide the giant panda and the elephants with food while also re-creating the exotic surroundings of the panda's natural habitat. Trees are skillfully positioned to double as rubbing posts for animals and abundant vines give animals such as the golden lion tamarins a place to climb. The animals eat the produce from the Zoo's vegetable garden as well as discarded flowers and prunings. Moreover, plants buffer the animal areas, beautifying the space and giving the animals more privacy.

In addition to the plants grown by the Zoo's horticulture staff for the park's use, still others are raised by the Horticulture Services Division to satisfy the needs around the Mall. All of the flowering plants that are used throughout the museum grounds and interiors are grown in 11 greenhouses located on the grounds of the Soldiers' and Airmen's Home in Washington, D.C. The greenhouses enable us to recycle and rejuvenate plants for a second life. For example, bulbs used this year in the indoor "Spring Bulb Show" at the Arts and Industries Building will be planted around the grounds. If we find ourselves with excess plants, they are given to Washington, D.C. school horticulture programs.

The greenhouses are also the home of the Smithsonian's unique Orchid Collection. Started by Mary Ripley initially for display purposes, the collection has evolved into a conservation project as well. In recognition of the expertise of horticulturist Cheyenne Kim, many orchids have been donated to the Smithsonian for "safekeeping" and propagation. Some 10,000 different types of orchids are cared for, one-third of which are species orchids. Many of these non-hybrids are endangered and may represent the only specimens in captivity. These are displayed for public enjoyment in glass cases at the National Museum of Natural History.

These beautiful interior and outdoor spaces create a network of retreats where visitors and staff alike can cleanse the mind and refresh the spirit. They deserve your attention the next time you pay a visit to the Smithsonian.

Have you ever seen a penguin fly?

Not through the air, but they sure can fly through water!

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Letters to the Editor

Phenomena, Comment and Notes

I enjoyed the February *Phenomena, Comment and Notes* column in which "two-foot" John P. Wiley jr. wondered what thoughts go through the mind of Gizzie, his four-pawed companion, and turned the column over to him. Gizzie's descriptions of walking with Old Clumsy (aka Wiley) were a revelation. However, the questions about dogs' patterns of thought and their communication were answered for me years ago by Gary Larson in a *Far Side* cartoon (below).
Kenneth R. Bland
Las Cruces, New Mexico

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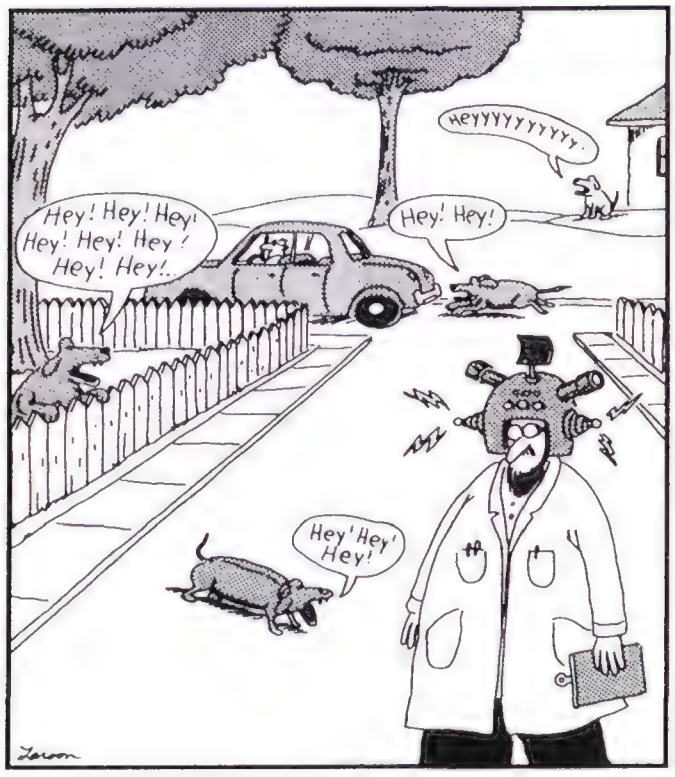

Donning his new canine decoder, Professor Schwartzman becomes the first human being on Earth to hear what barking dogs are actually saying.

I am a Chesapeake Bay retriever who lives in the foothills of the Sierra in Northern California. I was glad to read Gizzie's column and learn about his two-foot, Old Clumsy. I thought I was the only one with such a problem.

When my number-one two-foot is away, I sometimes get bored, so I have taught a neighbor two-foot down the road to throw pinecones for me. Even after months of training, it is often tough to get through his thick skull. He wastes hours in a room where he keeps the big, noisy, smelly machine that rolls fast over the ground on four round paws. He spends a lot of time putting strange objects into a box and then taking them out again. They appear to help the two-foot's paws do something they weren't designed for, particularly inside the smelly machine's mouth and stomach. The objects have a hypnotic power over him because he can't see me when I drop by to play "fetch" with him. I finally realized the only way to break the spell is to put my pinecones into the box with the strange objects, and now I have no more problem with him.
Chester Ferguson
Placerville, California

A neighbor of mine had a donkey named Chiquita who lived in a fenced-in area on my property. She was content there until she was joined by a mule named Jimmy Carter, who was a thorn in her side. He nipped at her, cajoling her to play, but she either bit him back or simply ignored him. If Jimmy ventured to drink from Chiquita's water basin, nibble at her food or seek shelter in a small shed from the sun or rain, he met with the donkey's wrath.

One night, Jimmy got too close to a porcupine. Throughout his convalescence, Chiquita permitted him to drink from her water, eat her food and take refuge in the shed. When she decided that he was sufficiently recovered, she reimposed the prior conditions: eat from your own pan, drink your own water, keep the heck out of my shed.

Her caring for the enemy during his affliction showed me that much more goes on in the brains of these "dumb animals" than we think.
Leah J. Forsmann
Red Bluff, California

Marriage proposals

The year 1944 was a leap year. I had recently graduated as a mechanical engineer and was drafted into the Army. On February 29, I was called out of formation and told to go to headquarters for a telegram, which was something to worry about in the war years. When I opened the telegram, everybody at HQ knew the news was OK because I broke out laughing. The message said: "It's official today. Want engineer for partner." We wed in September and our marriage lasted 48 glorious years before I lost her.
Howard S. Patterson
Dover, Delaware

Fish cops

David Helvarg wrote that the National Marine Fisheries Service "fish cops" seized 12 tons of salmon with a wholesale value of $46 million. Wow, that's $1,916.67 a pound. I wonder what the retail price would have been.
Jack K. Traub
West Sacramento, California
Considerably more than 12 tons were involved. The NMFS agents made a deal to purchase $48 million-worth of salmon at 60 cents per pound. Ed.

Last Page

Frederica Mathewes-Green's column "Think of all you'd miss if your reading skills weren't 'enhanced' by age" gave me much pleasure. Several months ago I saw a most enticing article advertised on the cover of a popular weekly magazine: "The 25 Most Disgusting People of 1996." It turned out to be "Intriguing People," which I fortunately discovered before spending my money on such a banal topic.
Cynthia Williams
Carmel, California

As a fellow "geezerette," I can say that everything Mathewes-Green wrote is disturbingly accurate (if I read her column correctly).
Jan Karcher
Vancouver, Washington

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The Object at Hand

By David Taylor

Even as a bust, the real king of Siam turns out to be a more complex chap than the bald-headed caricature made famous by Yul Brynner and others

The first thing you notice is the hair, not a bit like the shaven pate of Yul Brynner. The face appears solemn but not stern, the features sharp around the mouth but not frowning. It takes a moment—after the surprise of a face-to-face encounter at the Smithsonian's Museum Support Center in Suitland, Maryland—to adjust your past impressions from stage, screen and television to this reality. The object at hand is a bust of His Majesty King Mongkut of Siam (now Thailand), the man who loosely inspired the ruler played by Brynner, Rex Harrison et al. through thousands of performances of *The King and I* in all its incarnations.

So the basic story may be, if anything, a bit too familiar. Everyone remembers Anna, or Deborah Kerr anyway, entering the Siamese court in 1862 to be tutor to the king's myriad children (he had more than 80) while His Highness labors to bring his country not quite kicking and screaming into the modern age. We see him fall under her spell—and vice versa. We hear her sing "Getting to Know You" and we watch all those pretty child princes and princesses do a showstopping number called "The Small House of Uncle Thomas."

Ever since the Rodgers and Hammerstein hit premiered in 1951, Mongkut has been an icon of the exotic East for many Americans. In the musical, now doing its third successful reprise on Broadway, he is tough and essentially inscrutable (except that he wants to modernize his country), but this is a mere caricature of the real king. In Thailand today, the characterization still grates—imagine a cartoon of Ambassador Ben Franklin drawn by a Parisian etiquette coach circa 1778—which is why stage and screen productions of the story are still banned there. In fact, the Mongkut of history represented by the Smithsonian's life-size, polychrome plaster bust is well worth getting to know.

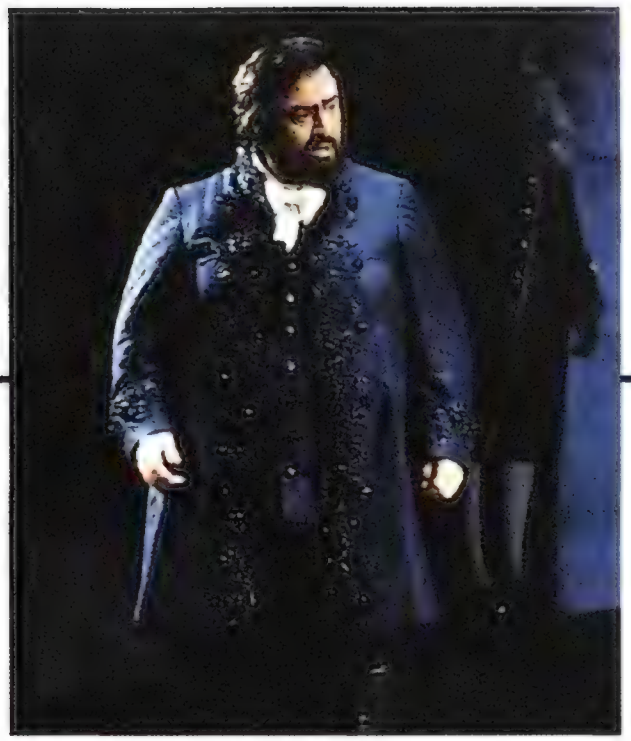
In stark contrast to Yul Brynner (below), the sculpture of Mongkut shows Siam's real monarch as calm and reflective.

Mongkut, who was born in 1804, spent more than half his adult life in the yellow robe of a Buddhist monk. For 27 years, he traveled the countryside with his alms bowl, ate one meal a day and studied scripture; for years he served as abbot at a quiet riverside temple on the outskirts of Bangkok. It was there that royal emissaries found him one steamy April morning in 1851, when they brought the news that his half brother, King Rama III, was dead.

Within days, the 47-year-old monk stepped from monastic life into the rich temptations and intricacies of the palace, with its inner city thronging with hundreds of women, its precincts patrolled by female guards and its life revolving entirely around his royal person. The holy man was now officially the "Lord of Life," the fourth ruler in Siam's Chakri dynasty, able to exert life-or-death control over some 5.5 million subjects. (As king, he banned the death penalty for monks who broke their vows of celibacy, putting them to work, instead, cutting grass for the royal elephants.) A spectacular coronation inaugurated the reign with great pomp. Brahmin priests sounded ceremonial conch shells. The new monarch, clad in golden robes, was carried off in a gilded palanquin. Even in that moment of glory, though, Mongkut made clear that he would scrutinize tradition more critically than had previous rulers. For the first time in 200 years Western diplomats were invited, and Buddhist monks played a visible role in the ceremony. This was just the kind of gesture feared by Siam's conservative nobility.

Once crowned, Mongkut traveled more widely than any other king had, revisiting many of the paths that he trod barefoot as a monk. Like Rex Harrison and Yul Brynner's monarch, he relaxed the stiff protocol of royal visits, permitting foreigners to salute him according to their own customs.

He had long observed the growing number of European steamships entering Bangkok's port and understood their importance. (The stage and screen king grasped this, too, but in those kindergarten versions, Mongkut caught up with Western studies only under Anna's tutelage.) The king's learning and discipline were formidable. He studied



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Latin with a helpful French bishop. He also acquired English from American missionaries, a Promethean task at a time when no Thai-English dictionary existed. To translate from Thai to English, the king first had to find a comparable word in ancient Sanskrit, then plow his way through the bulky Sanskrit-English dictionary to find a near match. It was not surprising that he sometimes startled visitors with a colorful turn of phrase. "There are Englishmen," he joked to one Scotsman, "who have not understanding of their own language when I speak."

Reading the English newspapers from Singapore and Hong Kong, the king followed the expansion of empires. Siam was a strong force in Southeast Asia, but European powers hungered on a global scale. His response to all that was like the insight gained from a koan: to escape dominion by any one Western power, he would open his doors to all. He signed trade treaties with England, France, the United States and half a dozen other countries, thereby limiting his vulnerability to each.

In cementing these relations, the king displayed a sensitivity to each country's situation. A royal letter to President Franklin Pierce included an unusually intimate daguerreotype portrait (right). It shows Mongkut bareheaded, wearing a simple robe and seated beside Queen Thepserin, mother of the future king Chulalongkorn. No throne or crown appears in the portrait destined for the land without royalty. His letters to Queen Victoria, on the other hand, invoked the bond of noble blood.

Mongkut was fascinated by the precision of Western scientific measurement. He filled his chambers with clocks, thermometers and barometers, and taught himself astronomy, erecting an observatory on the palace grounds. This led to his greatest scientific triumph—and, indirectly, to his death. In August 1868, the palace announced an expedition on the occasion of a solar eclipse. For villagers, eclipses foretold bad tidings; they saw them as attempts by the dragon Rahu to swallow the sun and used clanging bells and fireworks to impel Rahu to disgorge it. Mongkut believed he could disabuse such fears if he could predict the event with mathematical calculations.

Invitations provided guests with the latitude and longitude of a spot on the Siamese coast where the eclipse would last longest. A mission of French astronomers journeyed more than 6,000 miles from Paris to witness the event. They were met by Mongkut's entourage, including members of the royal family, retainers, skeptical court astrologers, horses, oxen and 50 elephants.

On the appointed morning, August 18, 1868, at the exact second indicated by the king's calculations, the sky went totally dark, a remarkable feat of prediction. Mongkut and his prime minister cried "Hurrah! Hurrah!" The exhausted French astronomers acknowledged his accuracy; court astrologers were nonplussed. But skeptics soon claimed justification for their fears and superstitions; in a matter of days, the king and several others in the royal party fell ill with malaria contracted on the marshy shore.

In October, an ailing Mongkut gathered his advisers and urged them: "please go on with our good work in the interest of the people." Then he lay upon his right side and recited the sacred name of the lord Buddha to fix his mind firmly in the moment of his death. Like the Buddha himself, he died on his own birthday: October 18. Eight years later, his son, King Chulalongkorn, commissioned the bust now at the Smithsonian. It was to be a centerpiece of the Siamese exhibition at the U.S. Centennial Exposition in Philadelphia in 1876.

Daguerreotype of Mongkut and Queen Thepserin was sent to fellow chief of state President Franklin Pierce in 1856.

"A bust is a Western idea," notes Lisa McQuail, an anthropologist studying the extensive Thai collection at Suitland. After years of research, sponsored by the Smithsonian's Heritage of Thailand Project, under the direction of curator Paul Taylor, McQuail has traced the bust to its likely creator: Prince Pradit Warakan, a sculptor who had actually known the king.

In Philadelphia, the Siamese exhibition joined those from nearly 50 other countries. In general, though, Asia's exotic otherness was too much for Americans to accept on an equal footing. Newspapers were reporting anti-Chinese violence in California. The Exposition's opening ceremony was marred by attacks on Asian diplomats. Many visitors had difficulty reconciling the "wonderful things" in the Asian exhibits, as one visitor put it, with the "quaint little people" who had made them.

This was the perfect audience for a memoir by Anna Leonowens called *The English Governess at the Siamese Court*, which had been published in London and Philadelphia six years before the Centennial. Anna had her eye on book sales and the lecture circuit. King Mongkut did indeed recruit her from Singapore in 1862 as one in a series of English-language tutors for his children. Once in Bangkok, Anna—a woman with a highly questionable background—reinvented herself as a widow of means. In her memoirs she upgraded herself again, presenting herself in the role of the king's trusted adviser and coloring many anecdotes to her advantage. But at points, Anna's observations overcome prejudice and self-interest. "He was more systematically educated," she wrote, "and a more capacious devourer of books and news, than perhaps any man of equal rank in our day."

The view of Mongkut popular in the West today, however, may owe less to Anna than to one Margaret Landon, a diplomat's wife who in 1944 took Anna's memoir and spiced it liberally with romantic daydreams to fashion the best-selling novel *Anna and the King of Siam*. From that came the 1946 movie with Rex Harrison, Rodgers and Hammerstein's disarming songs, Brynner's Tony award and Oscar, and a forgettable 1972 television series.

King Mongkut's bust may soon be in the public eye again. A book on this historic collection of more than 2,000 royal Thai gifts to the United States is under way. In addition, the Heritage of Thailand Project, which has been sponsoring research by McQuail and others, hopes to mount an exhibition of the gifts that will tour the world. King Mongkut would heartily approve.

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*SEC standardized returns assume you sold your shares at the end of each reporting period. A declining sales charge, which applies only if the shares were sold within six years of the purchase, is reflected in these returns. Investment return and principal will fluctuate so that your shares, when redeemed, may be worth more or less than their original purchase price. Past performance is no guarantee of future results.

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Smithsonian Highlights

Planning a Smithsonian visit?

Receive a free Associates' planning packet. Write Smithsonian Information, Smithsonian Institution, Washington, D.C. 20560, or call 202-357-2700 (voice) or 202-357-1729 (TTY), 9 A.M. - 5 P.M., Monday-Friday; 10 A.M. - 4 P.M., Saturday-Sunday. *Note:* Parking near the Smithsonian is limited. The Metrorail subway system is convenient to all museums (details in packet).

Begin your visit at the Smithsonian Information Center's Associates' Reception Desk—open 9 A.M. - 4 P.M. daily—in the Castle. Special materials await you there. The Court dining room in the National Museum of Natural History is permanently closed. Associates may now avail themselves of a discount on table service at the National Air and Space Museum's Wright Place restaurant, open 11:30 A.M. - 3 P.M. daily.

The Smithsonian home page on the World Wide Web (http://www.si.edu) offers on-line information about exhibitions, collections, events and products.

Museum Hours

Smithsonian museums are generally open 10 A.M. - 5:30 P.M. daily, except December 25. Hours at the National Zoo are 9 A.M. - 4:30 P.M. daily for buildings, and 8 A.M. - 6 P.M. for grounds, through April 14. Grounds will remain open until 8 P.M., April 15 - October 15.

Smithsonian Craft Show

The annual exhibition and sale will be held April 24-27 at the National Building Museum, 401 F Street, N.W. For hours, admission fees and advance tickets, call (202) 357-2700. See *Highlights Continued*, page 32.

Smithsonian Kite Festival

Thousands of kite devotees will gather at the Washington Monument on April 5 at 10 A.M. for the 31st annual Smithsonian Kite Festival—"Evolutions in Flight"—cosponsored by The Smithsonian Associates and the National Air and Space Museum. For information, call: 202-357-3030. Rain date, April 6.

'America's Smithsonian'

Portland Expo Center, Portland, Oregon (April 3 - May 6) Centerpiece of the Institution's 150th anniversary celebration, the traveling exhibition continues its tour with such Smithsonian treasures as a compass from the Lewis and Clark expedition, George Washington's sword, an Apollo 15 space suit and a 1948 Tucker sedan. *Note:* Admission is free, but passes are required. Advance passes are available for a service fee of $3.50 each by calling 1-800-913-TOUR. The Smithsonian Voices of Discovery program will bring a series of free lectures by Smithsonian scholars to Portland April 8-18. Topics will range from volcanoes to the American musical theater.

The Contributing Membership

The Contributing Membership supports the Institution's work in education, research and collections programs. Partially tax-deductible contribution categories are: Supporting, $60 (available only to non-D.C. area residents); Donor, $125; Sponsoring, $300; Sustaining, $600; Patron, $1,200; James Smithson Society, $2,000. Members enjoy special benefits including Smithsonian publications, the engagement calendar and behind-the-scenes tours. For further information, write: The Contributing Membership, Smithsonian Institution, 900 Jefferson Drive, S.W., Suite 1410, Washington, D.C. 20560 or call 1-800-931-3226.

A backlit large-scale transparency, *Woman and Her Doctor*, by the contemporary Canadian artist Jeff Wall is in a show at the Hirshhorn Museum through May 11.

Special April Exhibits, Events

National Air and Space Museum

How Things Fly Permanent installation elucidates the basic principles of flight, aerodynamics and propulsion.

The Enola Gay (runs indefinitely) Exhibition features the forward fuselage of the Enola Gay, the B-29 that dropped the atomic bomb on Hiroshima.

Cosmic Voyage (10:45 A.M., 12:55, 3:05 and 5 P.M. daily) Academy Award-nominated Imax film takes viewers on a journey through the known dimensions of the Universe.

National Museum of American History

24 Hours in Cyberspace (through April 13) Photographs and Website document both the harmonies and the paradoxes of life in cyberspace.

Guitars from the Scott Chinery Collection (runs indefinitely) Vintage guitars trace

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Science in American Life Permanent exhibition tracks advances and discoveries in science over the past 125 years.

National Postal Museum (Located next to Union Station on Capitol Hill)
Ties That Bind: The Newcomer's Experience (through May 1) Letters, photographs, illustrate the relationships between American immigrants and their families in other countries.

National Museum of Natural History
HoloGlobe (through August) First public showing of large-scale High-Definition Volumetric Display (HDVD) gives viewers a unique look at our planet.
The Mighty Marlin (runs indefinitely) Model of the 1,560-pound, 14½-foot, world-record black marlin caught by Mr. Alfred Glassell jr. in 1953.
Gems and Minerals Hall Gallery is closed for renovation until September 1997. The famous Hope Diamond is on view on the second floor of the Rotunda.

National Zoological Park
Amazonia Science Gallery New permanent exhibition looks at the work of Smithsonian biologists worldwide.
Pollinarium Permanent exhibition examines the means of plant reproduction.

Freer Gallery of Art
Telling Tales in Japanese Art (through May 1) Hand scrolls, albums, folding screens, sliding doors, fans, from the 13th through early 19th century highlight Japanese visual narratives.
Armenian Gospels (through May 1) Illustrations from medieval Armenian illuminated gospels.
The Natural World in Indian Painting (through May 1) Works on paper from 15th-19th-century India.

Arthur M. Sackler Gallery
The Bridge: Illusion in Clay (through July 6) A 60-foot-long, life-size ceramic sculpture, titled *The Bridge*, by contemporary Taiwan artist Ah-Leon.
Puja: Expressions of Hindu Devotion (runs indefinitely) Bronze, stone and wood objects made in India between the 9th and 20th centuries for use in worship.

National Museum of African Art
Adire: Resist-Dyed Cloths of the Yoruba (April 16 - August 17) Indigo resist-dyed textiles produced by Yoruba artists of southwestern Nigeria.
The Ancient Nubian City of Kerma, 2500-1500 B.C. (runs indefinitely) Exhibition celebrates Kerma, the oldest city in Africa outside Egypt to be excavated.

Scene from 1923 Paris show *Within the Quota* is in SITES Jazz Age exhibition.

Hirshhorn Museum & Sculpture Garden
The Collection in Context: Paul Gauguin (through May 7) Display explores the context and creation of artist's sculpture *Cylinder Decorated with the Figure of Hina and Two Attendants* (1891-93).
Jeff Wall (through May 11) The work of Canadian artist Jeff Wall, whose large-scale backlit photographic transparencies comment on and document contemporary life.

National Portrait Gallery
Red, Hot & Blue: A Salute to American Musicals (through July 6) Exhibition spotlights the major personalities who created the American musical theater.
Breaking Racial Barriers: African Americans in the Harmon Foundation Collection (through September 14) Portraits from the groundbreaking 1950s exhibition "Portraits of Outstanding Americans of Negro Origin."

National Museum of American Art
Singular Impressions: The Monotype in America (April 4-August 3) The work of artists, from Maurice Prendergast to Eric Fischl, who have explored the monotype process, in which a painted image is transferred through pressure to a sheet of paper.
American Photographs: The First Century (through April 20) Daguerreotypes, ambrotypes, tintypes, from the museum's Charles Isaacs Collection of early American photography.

Renwick Gallery
The Renwick at Twenty-Five (through July 13) Show celebrating Renwick's 25th anniversary features some of the finest achievements in recent craft.

Arts and Industries Building
Jazz Age in Paris (April 25-July 13) SITES show explores the early jazz movement.
Milt Hinton: Bass Lines (April 25-July 13) Photographs of fellow musicians by bassist Milt Hinton provide an intimate view of such greats as Dizzy Gillespie, Hank Jones and Cab Calloway.
Stories of the People (through August 10) Artifacts from the collection of the National Museum of the American Indian.
Discovery Theater
Live theater for young audiences. For information, call (202) 357-1500 (voice or TTY) weekdays, 10 A.M. - 4 P.M.

The Castle—Information Center
Smithson's Gift Permanent display tells the story of the British scientist whose bequest founded the Smithsonian.

Anacostia Museum
Museum Renovation The museum is closed until the fall of 1997.

Heye Center, National Museum of the American Indian (New York City)
Agayuliyararput (Our Way of Making Prayer): The Living Tradition of Yup'ik Masks (through August 17) Exhibition showcases more than 200 masks created by Yup'ik Eskimos.

Cooper-Hewitt, National Design Museum (New York City)
Disegno: Italian Renaissance Designs for the Decorative Arts (through May 18) Drawings, prints and decorative objects from 16th-century Italy examine Renaissance concepts of design, creativity.
Henry Dreyfuss: Directing Design (through August 31) Sketches, working drawings, models, prototypes, finished products by the industrial designer and his firm.
See *Around the Mall*, p. 34.

Smithsonian Tropical Research Institute
Our Reefs: Caribbean Connections (through May 7) Exhibition featuring aquariums is on view at the Miami International Airport, Concourse E, near Gate E-6.

Text continued on page 31

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Before prescribing, please consult complete prescribing information of which the following is a brief summary

WARNING: Coadministration of terfenadine with itraconazole is contraindicated. Serious cardiovascular adverse events, including death, ventricular tachycardia, and torsades de pointes have occurred in patients taking itraconazole concomitantly with terfenadine. This is due to elevated terfenadine concentrations caused by itraconazole. See CONTRAINDICATIONS, WARNINGS, and PRECAUTIONS sections

Another oral azole antifungal, ketoconazole, inhubits the metabolism of astemizole, resulting in elevated plasma concentrations of astemizole and its active metabolite desmethylastemizole, which may prolong QT intervals. Based on results of an *in vitro* study and the chemical resemblance of itraconazole and ketoconazole, coadministration of astemizole and itraconazole is contraindicated. See CONTRAINDICATIONS, WARNINGS, and PRECAUTIONS sections

Coadministration of cisapride with itraconazole is contraindicated. Serious cardiovascular adverse events including death, ventricular tachycardia, and torsades de pointes have occurred in patients taking itraconazole concomitantly with cisapride. See CONTRAINDICATIONS, WARNINGS, and PRECAUTIONS sections

INDICATIONS AND USAGE

SPORANOX (itraconazole capsules) is indicated for the treatment of the following fungal infections in immunocompromised and non-immunocompromised patients

1. Blastomycosis, pulmonary and extrapulmonary;
2. Histoplasmosis, including chronic cavitary pulmonary disease and disseminated, non-meningeal histoplasmosis;
3. Aspergillosis, pulmonary and extrapulmonary, in patients who are intolerant of or who are refractory to amphotericin B therapy; and
4. Onychomycosis due to dermatophytes (tinea unguium) of the toenail with or without fingernail involvement.

CONTRAINDICATIONS

Coadministration of terfenadine, astemizole or cisapride with SPORANOX (itraconazole capsules) is contraindicated. (See BOX WARNING, WARNINGS, and PRECAUTIONS sections.)

Concomitant administration of SPORANOX with oral triazolam or with oral midazolam is contraindicated. (See PRECAUTIONS section.)

SPORANOX should not be administered for the treatment of onychomycosis to pregnant patients or to women contemplating pregnancy.

SPORANOX is contraindicated in patients who have shown hypersensitivity to the drug or its excipients. There is no information regarding cross hypersensitivity between itraconazole and other azole antifungal agents. Caution should be used in prescribing SPORANOX to patients with hypersensitivity to other azoles

WARNINGS

In U.S. clinical trials prior to marketing, there have been three cases of reversible idiosyncratic hepatitis reported among more than 2500 patients taking SPORANOX (itraconazole capsules). One patient outside the U.S. developed fulminant hepatitis and died during SPORANOX administration. Since this patient was on multiple medications, the causal association with SPORANOX is uncertain. If clinical signs and symptoms consistent with liver disease develop that may be attributable to itraconazole, SPORANOX should be discontinued.

Prior to U.S. marketing, there have been three cases of life-threatening cardiac dysrhythmias and one death reported in patients receiving terfenadine and itraconazole. (See BOX WARNING, CONTRAINDICATIONS, and PRECAUTIONS sections.)

Coadministration of astemizole with SPORANOX is contraindicated. (See BOX WARNING, CONTRAINDICATIONS, and PRECAUTIONS sections.)

Concomitant administration of oral ketoconazole with cisapride has resulted in markedly elevated cisapride plasma concentrations, prolonged QT intervals, and has rarely been associated with ventricular arrhythmias and torsades de pointes. Due to potent *in vitro* inhibition of the hepatic enzyme system mainly responsible for the metabolism of cisapride (cytochrome P450 3A4), itraconazole is also expected to markedly raise cisapride plasma concentrations; therefore, concomitant use of cisapride with SPORANOX is contraindicated. (See BOX WARNING, CONTRAINDICATIONS, and PRECAUTIONS sections.)

PRECAUTIONS

General: Hepatic enzyme test values should be monitored in patients with preexisting hepatic function abnormalities. Hepatic enzyme test values should be monitored periodically in all patients receiving continuous treatment for more than one month or at any time a patient develops signs or symptoms suggestive of liver dysfunction.

SPORANOX (itraconazole capsules) should be administered after a full meal.

Under fasted conditions, itraconazole absorption was decreased in the presence of decreased gastric acidity. The absorption of itraconazole may be decreased with the concomitant administration of antacids or gastric acid secretion suppressors. Studies conducted under fasted conditions demonstrated that administration with 8 ounces of a cola beverage resulted in increased absorption of itraconazole in AIDS patients with relative or absolute achlorhydria. This increase relative to the effects of a full meal is unknown.

Information for patients: Patients should be instructed to take SPORANOX with a full meal.

Patients should be instructed to report any signs and symptoms that may suggest liver dysfunction so that the appropriate laboratory testing can be done. Such signs and symptoms may include unusual fatigue, anorexia, nausea and/or vomiting, jaundice, dark urine or pale stool.

Drug interactions: Both itraconazole and its major metabolite, hydroxyitraconazole, are inhibitors of the cytochrome P450 3A4 enzyme system. Coadministration of SPORANOX and drugs primarily metabolized by the cytochrome P450 3A4 enzyme system may result in increased plasma concentrations of the drugs that could increase or prolong both therapeutic and adverse effects. Therefore, unless otherwise specified, appropriate dosage adjustments may be necessary.

Coadministration of terfenadine with SPORANOX has led to elevated plasma concentrations of terfenadine, resulting in rare instances of life-threatening cardiac dysrhythmias and one death. (See BOX WARNING, CONTRAINDICATIONS, and WARNINGS sections.)

Another oral azole antifungal, ketoconazole, inhibits the metabolism of astemizole, resulting in elevated plasma concentrations of astemizole and its active metabolite desmethylastemizole which may prolong QT intervals. *In vitro* data suggest that itraconazole, when compared to ketoconazole, has a less pronounced effect on the biotransformation system responsible for the metabolism of astemizole. Based on the chemical resemblance of itraconazole and ketoconazole, coadministration of astemizole with itraconazole is contraindicated. (See BOX WARNING, CONTRAINDICATIONS, and WARNINGS sections.)

Human pharmacokinetics data indicate that oral ketoconazole potently inhibits the metabolism of cisapride resulting in an eight-fold increase in the mean AUC of cisapride. Data suggest that coadministration of oral ketoconazole and cisapride can result in prolongation of the QT interval on the ECG. *In vitro* data suggest that itraconazole also markedly inhibits the biotransformation system mainly responsible for the metabolism of cisapride; therefore concomitant administration of SPORANOX with cisapride is contraindicated. (See BOX WARNING, CONTRAINDICATIONS, and WARNINGS sections.)

Coadministration of SPORANOX with oral midazolam or triazolam has resulted in elevated plasma concentrations of the latter two drugs. This may potentiate and prolong hypnotic and sedative effects. These agents should not be used in patients treated with SPORANOX. If midazolam is administered parenterally, special precaution is required since the sedative effect may be prolonged. (See CONTRAINDICATIONS section.)

Coadministration of SPORANOX and cyclosporine, tacrolimus or digoxin has led to increased plasma concentrations of the latter three drugs. Cyclosporine, tacrolimus and digoxin concentrations should be monitored at the initiation of SPORANOX therapy and frequently thereafter, and the dose of these three drug products adjusted appropriately.

There have been rare reports of rhabdomyolysis involving renal transplant patients receiving the combination of SPORANOX, cyclosporine, and the HMG-CoA reductase inhibitors lovastatin or simvastatin. Rhabdomyolysis has been observed in patients receiving HMG-CoA reductase inhibitors administered alone (at recommended dosages) or concomitantly with immunosuppressive drugs including cyclosporine

When SPORANOX was coadministered with phenytoin, rifampin, or H_2 antagonists, reduced plasma concentrations of itraconazole were reported. The physician is advised to monitor the plasma concentrations of itraconazole when any of these drugs is taken concurrently, and to increase the dose of SPORANOX if necessary. Although no studies have been conducted, concomitant administration of SPORANOX and phenytoin may alter the metabolism of phenytoin; therefore, plasma concentrations of phenytoin should also be monitored when it is given concurrently with SPORANOX.

It has been reported that SPORANOX enhances the anticoagulant effect of coumarin-like drugs. Therefore, prothrombin time should be carefully monitored in patients receiving SPORANOX and coumarin-like drugs simultaneously.

Plasma concentrations of azole antifungal agents are reduced when given concurrently with isoniazid. Itraconazole plasma concentrations should be monitored when SPORANOX and isoniazid are coadministered

Severe hypoglycemia has been reported in patients concomitantly receiving azole antifungal agents and oral hypoglycemic agents. Blood glucose concentrations should be carefully monitored when SPORANOX and oral hypoglycemic agents are coadministered.

Tinnitus and decreased hearing have been reported in patients concomitantly receiving SPORANOX and quinidine. Edema has been reported in patients concomitantly receiving SPORANOX and dihydropyridine calcium channel blockers. Appropriate dosage adjustments may be necessary.

The results from a study in which eight HIV-infected individuals were treated with zidovudine, 8 ± 0.4 mg/kg/day, showed that the pharmacokinetics of zidovudine were not affected during concomitant administration of SPORANOX, 100 mg b.i.d.

Carcinogenesis, Mutagenesis and Impairment of Fertility: Itraconazole showed no evidence of carcinogenicity potential in mice treated orally for 23 months at dosage levels up to 80 mg/kg/day [approximately 10x the maximum recommended human dose (MRHD)]. Male rats treated with 25 mg/kg/day (3.1x MRHD) had a slightly increased incidence of soft tissue sarcoma. These sarcomas may have been a consequence of hypercholesterolemia, which is a response of rats, but not dogs or humans, to chronic itraconazole administration. Female rats treated with 50 mg/kg/day (6.25x MRHD) had an increased incidence of squamous cell carcinoma of the lung (2/50) as compared to the untreated group (0/50). Although the occurrence of squamous cell carcinoma in the lung is extremely uncommon in untreated rats, the increase in this study was not statistically significant.

Itraconazole produced no mutagenic effects when assayed in appropriate bacterial, non-mammalian and mammalian test systems

Itraconazole did not affect the fertility of male or female rats treated orally with dosage levels of up to 40 mg/kg/day (5x MRHD) even though parental toxicity was present at this dosage level. More severe signs of parental toxicity, including death, were present in the next higher dosage level, 160 mg/kg/day (20x MRHD).

Pregnancy: Teratogenic Effects. Pregnancy Category C: Itraconazole was found to cause a dose-related increase in maternal toxicity, embryotoxicity and teratogenicity in rats at dosage levels of approximately 40-160 mg/kg/day (5-20x MRHD) and in mice at dosage levels of approximately 80 mg/kg/day (10x MRHD). In rats, the teratogenicity consisted of major skeletal defects; in mice it consisted of encephaloceles and/or macroglossia.

There are no studies in pregnant women. SPORANOX should be used for the treatment of systemic fungal infections in pregnancy only if the benefit outweighs the potential risk. SPORANOX should not be administered for the treatment of onychomycosis to pregnant patients or to women contemplating pregnancy. SPORANOX should not be administered to women of child-bearing potential for the treatment of onychomycosis unless they are taking effective measures to prevent pregnancy and the patient begins therapy on the second or third day of the next normal menstrual period. Effective contraception should be continued throughout SPORANOX therapy and for 2 months following treatment.

Nursing Mothers: Itraconazole is excreted in human milk; therefore, SPORANOX should not be administered to nursing women.

Pediatric Use: The efficacy and safety of SPORANOX have not been established in pediatric patients. No pharmacokinetic data are available in children. A small number of patients age 3 to 16 years have been treated with 100 mg/day of itraconazole for systemic fungal infections and no serious unexpected adverse effects have been reported.

In three toxicology studies using rats, itraconazole induced bone defects at dosage levels as low as 20 mg/kg/day (2.5x MRHD). The induced defects included reduced bone plate activity, thinning of the zona compacta of the large bones and increased bone fragility. At a dosage level of 80 mg/kg/day (10x MRHD) over one year or 160 mg/kg/day (20x MRHD) for six months, itraconazole induced small tooth pulp with hypocellular appearance in some rats.

While no such bone toxicity has been reported in adult patients, the long term effect of itraconazole in pediatric patients is unknown.

HIV-infected Patients: Because hypochlorhydria has been reported in HIV-infected individuals, the absorption of itraconazole in these patients may be decreased.

The results from a study in which eight HIV-infected individuals were treated with zidovudine, 8 ± 0.4 mg/kg/day, showed that the pharmacokinetics of zidovudine were not affected during concomitant administration of SPORANOX, 100 mg b.i.d.

ADVERSE REACTIONS

In U.S. clinical trials prior to marketing, there have been three cases of reversible idiosyncratic hepatitis reported among more than 2500 patients One patient outside the U.S. developed fulminant hepatitis and died during SPORANOX (itraconazole capsules) administration. Because this patient was on multiple medications, the causal association with SPORANOX is uncertain. (See WARNINGS section.)

ONYCHOMYCOSIS

Adverse events in the following table led to either temporary or permanent discontinuation of treatment:

Body System/Adverse Event	Incidence (%) (n=112)
Elevated Liver Enzymes (>2x normal range)	4%
Gastrointestinal Disorders	4
Rash	3
Hypertension	2%
Orthostatic Hypotension	1%
Headache	1%
Malaise	1%
Myalgia	1%
Vasculitis	1%
Vertigo	1

SYSTEMIC FUNGAL INFECTIONS

Adverse experience data in the following table are derived from 602 patients treated for systemic fungal disease in U.S. clinical trials, who were immunocompromised or receiving multiple concomitant medications. Of these patients, treatment was discontinued in 10.5% of patients due to adverse events. The median duration before discontinuation of therapy was 81 days, with a range of 2-776 days. The table lists adverse events reported by at least 1% of patients.

Body System/Adverse Event (Incidence ≥ 1%)	Incidence (%)
Gastrointestinal Disorders	
Nausea	10.6
Vomiting	5.1
Diarrhea	3.3
Abdominal Pain	1.5
Anorexia	1.2
Body as a Whole	
Edema	3.5
Fatigue	2.8
Fever	2.5
Malaise	1.2
Skin and Appendages	
Rash	5.6*
Pruritus	2.5
Central and Peripheral Nervous System	
Headache	3.8
Dizziness	1.7
Psychiatric Disorders	
Libido decreased	1.2
Somnolence	1.2
Cardiovascular Disorders	
Hypertension	3.2
Metabolic and Nutritional Disorders	
Hypokalemia	2
Urinary System Disorders	
Albuminuria	1.2
Liver and Biliary System Disorders	
Hepatic function abnormal	2.7
Reproductive Disorders, Male	
Impotence	1.2

*Rash tends to occur more frequently in immunocompromised patients receiving immunosuppressive medications

Adverse events infrequently reported in all studies included: constipation, gastritis, depression, insomnia, tinnitus, menstrual disorder, adrenal insufficiency, gynecomastia and male breast pain.

In worldwide postmarketing experience with SPORANOX, allergic reactions including rash, pruritus, urticaria, angioedema and in rare instances, anaphylaxis and Stevens-Johnson syndrome, have been reported. Marketing experiences have also included reports of elevated liver enzymes and rare hepatitis. Although the causal association with SPORANOX is uncertain, rare hypertriglyceridemia and isolated cases of neuropathy have also been reported.

OVERDOSAGE

Itraconazole is not removed by dialysis. In the event of accidental overdosage, supportive measures, including gastric lavage with sodium bicarbonate, should be employed.

No significant lethality was observed when itraconazole was administered orally to mice and rats at dosage levels of 320 mg/kg or to dogs at 200 mg/kg.

Rev. April 1995, September 1995

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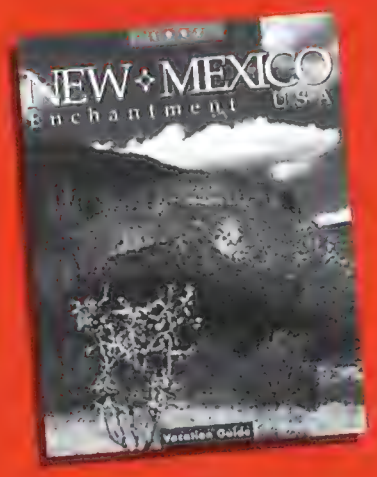

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To become a member, or for fee and ticket information, call (202) 357-3030. April events include:
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Highlights Continued

The captivating art of crafts

The 15th annual Smithsonian Craft Show will feature works by 120 contemporary U.S. artists

At first glance, the colorful patchwork hanging across the room appears to be the handiwork of a skilled quilter. Even from a distance of a few feet, you are tempted to reach out and touch the finely stitched cloth. But a closer look reveals something quite different. The folded "quilt" is actually the work of wood sculptor Fraser Smith, who used carved linden stained with inks to fabricate a quilt that looks real enough to throw across your bed. Based in Florida, Smith has been working in this style of "Superrealism" for some 15 years.

Even the smallest child couldn't slip into the snazzy oxford at right. Designed for the lapel not the leg, the silver-and-bronze creation is actually a pin—the work of jeweler Danielle Berlin. A New Yorker, Berlin made her first shoe pin five years ago, after receiving a birthday card that bore a beguiling pump drawn by Andy Warhol. The day after she took the pin to her Madison Avenue gallery, she received word that it had been sold. The purchaser: Imelda Marcos.

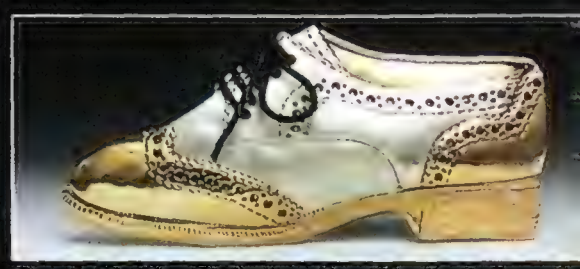
This year's Smithsonian Craft Show is full of such surprises—glass and ceramic works that take the shape of mythical creatures; pins and pendants in the form of frogs, snakes, butterflies, people. There's even a peacock sporting cowboy boots, and a gourd decked out as a "Nefertiti for the '90s." Sponsored by the Smithsonian Women's Committee, the annual exhibition and sale will be held April 24-27 at the National Building Museum, 401 F Street, N.W., in Washington, D.C.

"There were more than 1,300 applications this year," says 1997 show chairman Brent Goo. "The jurors chose to return artists whose work continues to challenge, and singled out some new talents whose artistry will surprise and captivate. Their insistence on quality will make this show rival any in the nation."
Diane M. Bolz

Figurative sculpture by Olga Dvigoubsky Cinnamon is fashioned of fiber, beads.

Joseph Shuldiner's paper lamps reflect his interest in architecture and light.

New York artist Carol Hearty's dynamic "Escargot" handbag is of leather, wood.



Danielle Berlin's "oxford" pin is hand fabricated of silver, bronze and leather

Porcelain fish-and-snake pin is creation of Cynthia Chuang and Erh-Ping Tsai.

Handblown glass sculpture, "Bird," is by Lisa Schwartz and Kurt Swanson.

Fraser Smith uses a computer to help in design phase of his wood sculpture.

TURKEY

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Around the Mall and Beyond

By Michael Kernan

Doghouses, lace, luggage, wallpaper, backpacking tents—since 1897, the Cooper-Hewitt, National Design Museum has been amazing us with a wonderful miscellany

The Polaroid Auto 100 (1963), Big Ben clock (1939) and Model 500 phone (1956) by industrial designer Henry Dreyfuss were all hugely successful.

When the Cooper-Hewitt, National Design Museum announced a $20 million renovation of its New York City home, the old Andrew Carnegie mansion (plus two adjacent townhouses)—a project to coincide with the museum's centennial this year—60 architects applied for the job. The intriguing challenge was to turn this classic 1902 pile into a cutting-edge museum without destroying its character. And character it has.

The steel baron built the place at 91st Street and Fifth Avenue for himself, his wife and daughter, and 19 servants. The first private home ever built with a structural steel frame, it had 64 rooms, two elevators, a generator in case the city power plant broke down, two brass-fitted furnaces fed from a 250-ton coal bin, an air-conditioning system with fans that blew air through cheesecloth filters, over tanks of cold water and into all the rooms, and a three-story aeolian organ on which the family organist performed every morning at 8.

There was a fine garden, a playhouse for young Margaret, a sewing room, music room, drawing room, picture gallery, teakwood library, gymnasium and an oaken staircase you could drive a Sherman tank up . . . You know, this is a complicated story. I have to cover the history of three inspired collectors, the Hewitt sisters, plus the recent changes in the building plus something about the incredible collections themselves, plus a little about Henry Dreyfuss. Why don't we just start with a tour? "The ceiling fixtures are original," remarks my guide, a Cooper-Hewitt docent, as she points to the massive octagonal rosettes of Scottish oak that lead the eye to the monumental staircase; its risers, she notes, are only six inches high, "perhaps because Carnegie was kind of short, 5 feet 2."

"If you'd come here as a guest of the Carnegies," she says while ushering me through the white marble front vestibule and out to 91st Street, "you'd give your coat to a butler here. But it's been remodeled to make access easier." With a virtually unnoticeable four-foot extension of the pillared entryway, a ramp has been inserted, giving stairless access to the main door. Push a button and the two 800-pound bronze doors open, letting you into the Beaux-Arts vestibule, where a little elevator awaits.

"It used to be quite a rigmarole for people who couldn't climb stairs to get into this building, but we've solved that problem," the docent explains. "Another big challenge is to show our exhibits of modern design within the context of a turn-of-the-century mansion."

She takes me into the museum shop, once the music room, with carved ceiling, vintage chandelier and, in each corner, a golden decoration on a musical theme. Then we enter the magnificent glass conservatory. "We had to take that whole conservatory down, a thousand pieces of glass and steel, because it was leaking so. The area was wrapped in industrial plastic while they releaded the glass and finally put it all back together."

Through the refurbished windows we can see a two-story passageway being completed; it will connect the mansion to the townhouses. They were gutted and joined internally so that all four stories can be used for a new Design Resource Center, where scholars can view items from the collection.

The history of the Cooper-Hewitt Museum (SMITHSONIAN, November 1977) begins with Peter Cooper who, you may recall, was the inventor of the Tom Thumb (arguably the first American-made locomotive) and the founder of

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Cooper Union College for the Advancement of Science and Art. His daughter married Abram Hewitt, a pioneer in the steel industry, and they had three lively daughters, Amy, Eleanor and Sarah.

These three young women loved to collect beautiful things. They traveled the world picking up drawings and prints, exotic textiles, furniture, ceramics and buttons, and compiling hundreds of large scrapbooks showing the evolution of design across many cultures and centuries.

In 1897 the sisters opened their Museum for the Arts of Decoration on the fourth floor of granddad's Cooper Union. The public was invited to peruse the ever-growing laboratory of design: 20,000 fabrics; 6,000 wall coverings, the largest accumulation in America; 1.5 million pictures of various kinds, not to mention clocks, jewelry, birdcages, 4,280 matchboxes and 2,000 buttons.

But eventually, as you might imagine, the museum needed more room for the collections. In 1968 the Smithsonian agreed to make it one of its own, and the Carnegie Foundation provided the mansion. The transfer took eight years and there are now 250,000 objects. The Cooper-Hewitt is the only museum in America devoted exclusively to historical and contemporary design.

"Here's the textile department," my guide tells me. "Everything's crowded in and covered with plastic because of the renovation." I glimpse microscopes for studying different weaves; one project concerns the mechanics of knitting.

Then we enter the library, with its 50,000 volumes on design, from *The Art of the Tin Toy* to *Bohemian Porcelain*. "We have one of the world's largest collections of pop-up books, too," my mentor adds. "Also, books on English drinking glasses, fans, spoons and other everyday things that tell us who we are."

This, she tells me, is the whole idea of a design museum. The centennial will feature some stunning shows, beginning with "Disegno: Italian Renaissance Designs for the Decorative Arts," which runs through May 18, and the first major retrospective on Henry Dreyfuss, the great industrial designer whose style influences the look of America to this day: from the Princess, Trimline and TouchTone phones, to Westclox alarms, Polaroid cameras, airline seats and the ubiquitous round Honeywell thermostat. This exhibition will be open through August.

It was organized by guest curator Russell Flinchum. I see that the subtitle of his book on Dreyfuss is *The Man in the Brown Suit*, and I ask what that is about. "Henry Dreyfuss was a master at creating a strong persona. His closet was full of brown clothes; they were his hallmark and served as an instant identifier. They set him apart from the gray- and blue-suited business people who were his clients. His presentations were carefully calculated and very persuasive, and he used the force of his personality to see his priorities through. He was the first industrial designer to be taken very seriously, the first to be brought in on retainer by the majority of his clients."

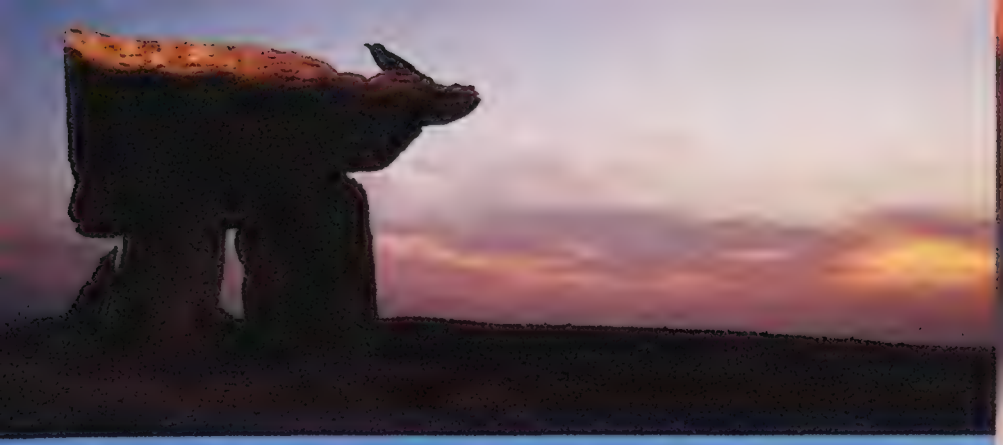
I call on Dianne Pilgrim, the visionary director since 1988, to get an overview of the Cooper-Hewitt. When, after all, did people first perceive that design itself, the history of design, was worthy of study? "I think it was the world's fairs that started it," she says. "Like the Crystal Palace in 1851. You showed off your national products and saw what others were doing and got inspiration from that. Fairs were industrial trade shows. The word turns up in the 1891 Cooper Union yearbook, where it talks about design, designers, even interior designers."

Design became a viable profession in the late 1920s, she adds, through innovators like Henry Dreyfuss. The theater was a major influence along with industry. "The Bauhaus spread the idea of good design, but it wasn't mass-produced. Americans did that. We're action-oriented. Look at the new housing after World War II." The idea of learning by showing appealed to Pilgrim from the start, for she is dyslexic. "Visual arts have always been my words and my way of learning," she explains.

Right off, upon arriving here from the Brooklyn Museum, she discovered that something had to be done to better house the collection and the staff of 65. "To move an object from one of the townhouses to the mansion, you had to go down steep stairs, go outside, walk across the terrace and up a double flight of stairs," she recalls. "That was just not acceptable."

As Pilgrim explains two other centennial year exhibitions—a show on backpacking tents, which opens outside in the garden in June, and "Design for Life," opening in September—I begin to understand the Cooper-Hewitt's big picture. Design affects the look and feel of just about everything, from buttons to bulldozers, from glasses to glockenspiels, from highway signs to the highways themselves, and the cities they lead to. Designer cities? Some are certainly better designed than others.

Among the 250,000 objects at the Cooper-Hewitt are a 1930 book of recipes from London's Savoy Hotel and a piece of lace, circa 1600, from Portugal.



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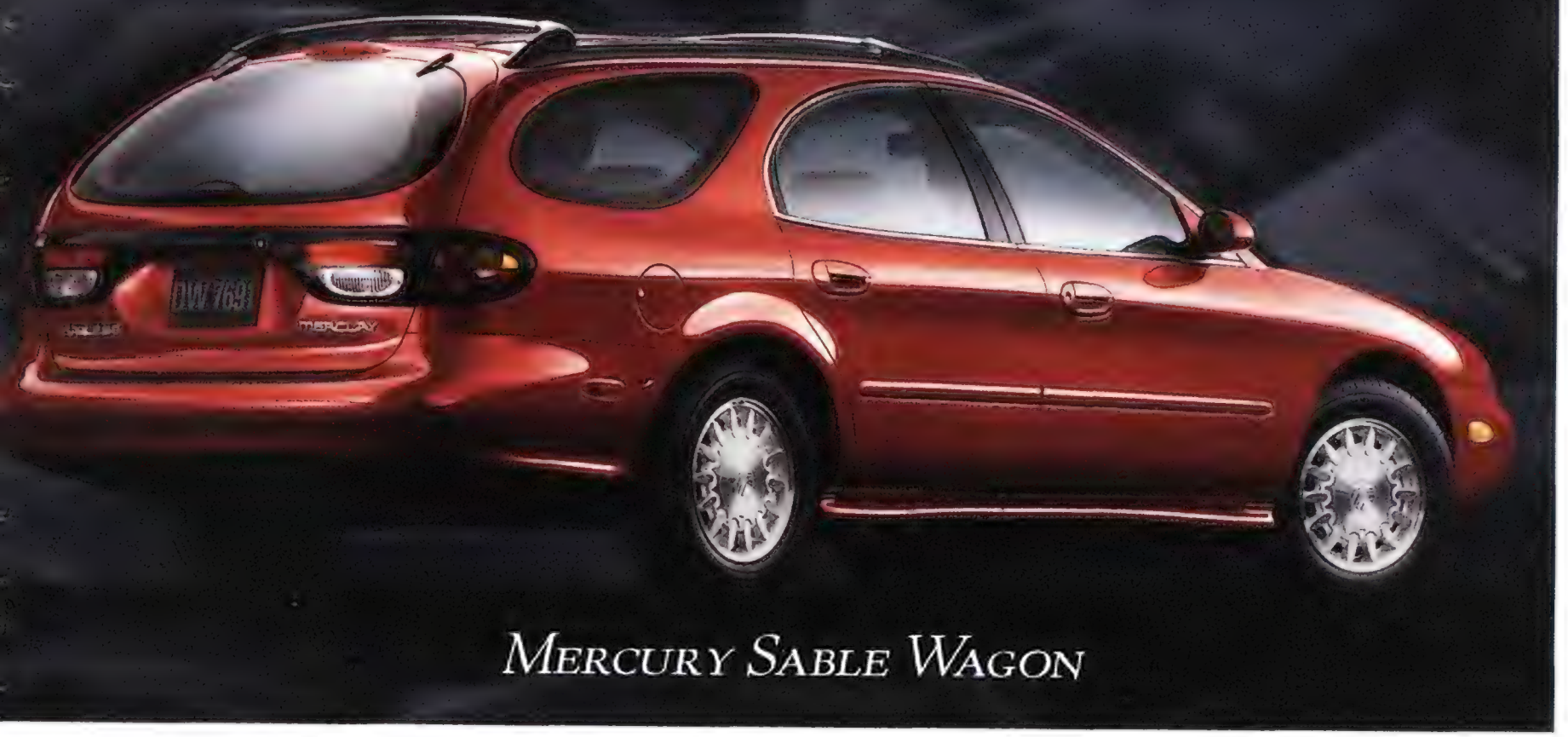

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By David Roberts

Sieur de La Salle's fateful landfall

After 300 years, the wreck of a beautiful French ship in Texas yields clues and treasure from a bold explorer's last voyage

Fanciful view used in 1698 to illustrate the "unhappy adventures" of La Salle shows two ships and (sinister detail) a man on far beach being captured by Indians.

In my hands I cradled the wine bottle, miraculously unbroken after more than 300 years, and thought of La Salle. The squat, blackish-brown flask was crusted with seashells, welded to the glass during the slow course of centuries. Only a few days before, the bottle had been plucked from the hold of a ship named *Belle*, which had sunk in Texas' Matagorda Bay in the early months of 1686.

With the ship had gone the last glimmer of the grandiose dream of one of America's boldest explorers, René-Robert Cavelier, Sieur de La Salle. Only four years before, the Frenchman had led the first European party to descend the Mississippi from the Illinois River all the way to the Mississippi's mouth in the Gulf of Mexico. On the proudest day of his life, April 9, 1682, La Salle laid claim to virtually all the interior of North America for his country, naming the newfound land Louisiana, after his monarch, the Sun King, Louis XIV.

Two years later La Salle returned with about 300 soldiers, seamen and would-be colonists on a secret mission whose audacity takes one's breath away today. Sailing covertly into the Gulf of Mexico, waters that a century earlier Philip II of Spain had declared off-limits to all non-Spaniards—on pain of death—La Salle planned to enter the mouth of the Mississippi, push 180 miles upriver, build a fort, recruit 15,000 Indian allies, and strike against the Spanish forts and silver mines in northern Mexico.

Instead, everything went wrong. By January 1686, the small but superbly built *Belle* (51 feet long but only 14 feet at the beam) was the only ship left of the four with which the explorer had set out from France a year and a half before. More than half his colonists were dead. La Salle himself, as he finally had to admit, was lost. A huge geographical blunder (see map, p. 42) had led him to seek the mouth of the Mississippi 400 miles west of where it is. Under the delusion that one of the many channels of the great river flowed into Matagorda Bay, he landed his colonists there.

The antique bottle I held in my hands was a deeply ironic emblem of La Salle's catastrophe. Perhaps Tessier himself, the incompetent, drunken master in charge of the ship, had drained it of the wine or eau-de-vie it once held. La Salle had set out with 20 men to explore the wilderness and left the *Belle* under Tessier's command. The crew was ordered to make depth soundings, pushing as far as possible inside the bay, then stay aboard ship at anchor to await La Salle's return. He told them he would be away for only ten days. In fact, he was gone for three months.

Photographs by Kay Chernush

Misleading antique map (above) had Mississippi emptying into Gulf not far from Matagorda Bay, where La Salle landed to search for it (right). Inset shows wreck of *Belle* and fort built by colonists. The exact site of La Salle's murder, somewhere near Trinity River, is still unknown.

The crew's dogged obedience to their leader's command led to demoralization, and death. The ship ran out of fresh water. Several sailors died of thirst. Tessier broke into the liquor supply, including a large store of Spanish wine the abbé attached to the expedition had brought to consecrate the Mass. Of the ship's master, says Henri Joutel, who left the most reliable firsthand account of the expedition, "there was not a single day when he was not drunk." When seven men took the only skiff to search for fresh water, the inebriated Tessier failed to hang a lantern from the mast to indicate the ship's position in the dark. Instead, he set up a candle that quickly guttered out. Neither skiff nor men were ever seen again.

At last what was left of the crew rebelled and tried to sail for land, but they were too few and too weak to work the ship. A fierce storm sprang up—a blue norther of the sort that still wreaks havoc on the Gulf Coast—driving the helpless *Belle* before it. Dragging anchor and listing, the ship ran aground near a barrier peninsula.

For three centuries the *Belle* was lost. Indeed, so complete was the devastation of La Salle's failed colony that modern settlers in Texas had no sure knowledge even of its general whereabouts. Then, in July 1995, after a long and spectacular piece of high-tech submarine sleuthing, a team from the Texas Historical Commission (THC) found the wreck, under 12 feet of water and tons of muddy sand. Off and on for 17 years, the team led by state marine archaeologist Barto Arnold had searched the bay for the elusive vessel. They used a magnetometer, which detects iron underwater—or even, in the case of very old wrecks, the rusty ghost of iron that has completely corroded away—and found more than 300 "anomalies," the little blips on the magnetometer screen that show the presence of iron. The placid-looking waters of Matagorda disguise the bay's treacherous shifting sandbars; at least 200 vessels have sunk here. But after analyzing the anomalies in relation to old maps and historical accounts, Arnold decided to take a closer look at the three dozen likeliest.

"The first day at the site, we sent divers down," he says. "They found a man-made wooden plank. So we knew we had something. Then some cast-lead shot, which meant it was historic, but could date from after the Civil War. And finally a brass buckle of a style made before 1800."

The water in Matagorda Bay is so murky that divers worked there by feel rather than sight. "Archaeology by Braille, I call it," diver Chuck Meide says. "I put my hand on this object. I thought at once it was the handle of a cannon. If it was a cannon, I knew exactly where the

David Roberts is an expert on the archaeology of the Southwest. His latest book, In Search of the Old Ones, *about the Anasazi, is now out in paperback.*

other handle ought to be. I stuck my hand down, and there it was. My dive partner claims she could hear me screaming underwater."

The excited team got ropes around the cannon, craned it to the surface, then chipped and soaked away the stony concretions that clung to it. The cannon (p. 53) has become the crown jewel of a small traveling exhibition of finds from the *Belle*. The exquisite bronze four-pounder weighs 793 pounds and looks in almost mint condition. The handles, in the fashion of the day, are cast as leaping dolphins. A bas-relief *L* topped by a crown stands for Louis XIV.

Traditionally, a site such as the *Belle* (which has been called the most important shipwreck ever found in North America) would be excavated by divers working underwater. But the THC decided on an ambitious alternative. Last summer a crew of marine engineers built a massive cofferdam around the site. Driving steel pilings a full 45 feet into the muck of the sea bottom (the depth necessary to forestall seepage), the engineers built an octagonal fence around the whole wreck. Then they built another one around the first and filled the space in between with sand as further protection. Once the cofferdam was in place, the seawater inside was pumped out. When the engineers were finished, archaeologists could get at the hull of the *Belle*, buried in the mud 12 feet below the surface of the surrounding bay.

On a warm, sunny day last December when I climbed down the metal scaffolding into the hole in the water that the cofferdam had carved, I felt as if I were entering some macabre futuristic factory. The nonstop roar of the generators made conversation with project directors Jim Bruseth and Toni Carrell difficult. Staccato bursts from a pneumatic chisel gnawing away at the concretions that had all but strangled the ship seemed to banish thought. The THC excavators, all covered with gray mud, were sketching, photographing and measuring, then brushing away muck from the artifacts with delicate tools.

At first it was hard to make sense of the scene, littered as the seafloor was with burlap cloths and "pick boards" (aluminum scaffolding spanning the wreck, on which the archaeologists awkwardly lie as they reach down to scrape and clean). Then I made out the outlines of the wooden hull of the *Belle*, still canted to starboard where it had come to its storm-tossed rest in 1686. Suddenly I realized what a herculean labor faced the THC team. Unlike ordinary sea sand, the gray mud in which the hold of the *Belle* is buried forms an almost perfect anaerobic preservative. But the moment the fragile wood is exposed to air, it begins to deteriorate, almost as if smoldering away. Even as archaeologists remove each stave and plank, they have to keep everything made of wood soaking wet, to preserve it until the eventual (and infinitely tedious) conservation process begins in a lab at Texas A&M University. Except for brief moments when a sector was uncovered for me to take a look, the site had to be kept swaddled in wet burlap. While one worker excavates a wooden barrel or box, another sprays everything in sight with a glorified garden hose. It is hard to imagine more trying conditions for doing archaeology. "About a dig like this," Toni Carrell remarks, "we sometimes say, 'Everything is on fire.' All we can do is try to slow it down to coals and embers."

By the time he stood poised, during the last days of 1681, to begin his epochal descent of the Mississippi, La Salle had spent nearly a dozen years exploring North America. He built the first commercial sailing ship to navigate the Great Lakes, and he pioneered trips down the Illinois and the Ohio rivers. Yet modern-day assessments of La Salle as a leader and as a man range from the idolatrous to the withering. Francis Parkman, whose classic *La Salle and the Discovery of the Great West* still stirs one's blood, wrote of the explorer that he was

Aerial photograph gives an idea of the maze of marshes and tortuous channels inland from Matagorda Bay.

Busy *Belle* dig site involves the remarkable use of an octagonal cofferdam. The central area—under the steel roof—is pumped dry to permit work on the wreck. Sand between the two walls absorbs any seepage.

graced by "an invincible determination," and that "in his faults the love of pleasure had no part." Henri Joutel, the loyal memoirist of the last expedition, concurred: "When Monsieur de La Salle was among us, pleasure was often banished."

Almost alone among the French in the New World, La Salle sought to understand Indian languages and cultures. Within three years of his arrival in Canada he could speak at least eight Indian languages—an invaluable asset as he pushed into terra incognita. In 1669, near the Niagara River, La Salle bartered for a Shawnee captive named Nika to serve as his guide. Nika became La Salle's trusted companion for the rest of his life.

Leading men into a hostile, trackless continent, miles—years even—away from safety, requires an iron discipline hard to imagine today. La Salle was the kind of man who could lead, but not conciliate. From 1678 to 1681, he made so many bitter enemies among his fellow Frenchmen that during a mere three years spent on the Great Lakes and Mississippi tributaries, four attempts were made on his life. "Few men knew him," writes Parkman; "he was a sealed book to those about him." He was

often criticized for being harsh and dismissive toward his men, and often so suspicious of intrigues against him as to border on the paranoid. For Parkman, that rigid demeanor masked an inborn timidity, triggered especially in the presence of La Salle's social betters.

La Salle was certainly prone to severe and prolonged illnesses, some of which may have been psychosomatic. The leading contemporary La Salle scholar, Robert S. Weddle, reads the man as a manic-depressive, given to "wild mood swings and periods of deep depression that often followed the failure of some extreme effort."

Even Parkman raises the question of whether La Salle possessed "mental soundness." The engineer Minet (first name unknown), who sailed on La Salle's last expedition, and whose account of the journey was discovered only in 1981, found La Salle impossibly haughty and headstrong: "No one tells him anything. I saw a man who had made a mockery of the court and was making a mockery of us. . . . This is a man who has lost his mind."

It is tempting to fault La Salle at every hand for the tragedy of his last expedition and to question his every decision. Yet his two-month descent of the Mississippi four years before with a team of 50 Frenchmen and Indians was as brilliant an exploratory feat as had ever been performed in North America.

After that triumph, La Salle returned to France in 1683. He kept worrying about rival explorers and provincial officials bent on denying him recognition for his deed. To his credit, he managed to wangle a rare audience with Louis XIV and stirred the Sun King's total enthusiasm for a grand plan of colonial empire. The French king was interested in stealing a march on the Spaniards.

On August 1, 1684, La Salle sailed from Rochefort with four ships and some 300 men, women and children. One ship, the *Joly*, a 34-gun man-of-war, served as escort for the expedition; the following March it was to return to France from the Gulf of Mexico with about a hundred people on board. Most of the goods and colonists were carried on the 300-ton cargo ship, the *Aimable*, but the pride of the fleet was the small and elegant *Belle*, outfitted for the expedition at the king's command by master shipwrights in Rochefort.

Trouble, however, was also built into the expedition. The captain of the *Joly*, snooty, wellborn Taneguy le Gallois de Beaujeu, was outraged to find himself subordinate to La Salle. An officer in the royal navy, Beaujeu railed against taking orders from a man "who has no experience of war except with savages, . . . who has no rank, and never commanded anybody but schoolboys."

In Saint-Domingue (today's Haiti), the smallest ship, a ketch carrying provisions, was captured by Spanish galleys. Fifty men (including La Salle) fell seriously ill and others deserted. When some of the deserters were captured, Spain learned of La Salle's plan to invade the Gulf. By 1686 the Spanish had launched an all-out manhunt for the intruder.

View toward bow shows ribs, hull planking and part of bulkhead. Spray keeps wood from drying and cracking.

Perched on a "pick board" stretched over the wreck, Jim Bruseth reaches for a wooden box full of trade goods.

The Mississippi Delta is a maze of lagoons, swamps, and twisty channels, the current so braided and lazy that it can barely be detected. Still, it seems scarcely credible today that La Salle could have failed to recognize the mouth of America's greatest river and overshot it by 400 miles. Several recent scholars, most notably Robert Weddle and Duke University's Peter H. Wood, argue convincingly that even back in 1682, when he had reached the mouth of the Mississippi, La Salle was effec-

tively lost. No means had yet been invented to calculate longitude accurately, and a faulty astrolabe caused a two-degree mistake in La Salle's reckoning of latitude. After he had gone down the big river in 1682, La Salle believed (with the authorities of the day) that it emptied into the Gulf of Mexico about 150 miles north of what is now the Mexican border. And the geography of La Salle's maps was largely conjectural.

In any case, it was not until January 6, 1685, that La Salle's ships made landfall near Galveston. For weeks he scouted up and down the tricky coast, looking for a big bay, a safe anchorage and suitable land on which to deliver his supplies and colonists. Late in January he found all three near Matagorda Bay. But on February 20 twin disasters struck.

A few weeks before, La Salle had made contact with the local Karankawa Indians. He was dismayed to find that none of the native languages he could speak helped at all in understanding these tall, naked, well-built men with tattoos on their faces. While he was trying to befriend them, the Karankawas suddenly took several Frenchmen captive. As La Salle marched into their village to reclaim the prisoners, he heard a cannon shot from the *Aimable*.

It was later claimed that the captain of the *Aimable* was drunk from the too liberal ration of wine La Salle had doled out. La Salle had left channel markers, and told the captain not to sail in, but to be towed by ship's boats manned by oarsmen. The captain of the big supply ship disobeyed, however, and hoisted sail, promptly hitting a sandbar. The ship was lost. Men struggled for days to get it off, or at least salvage the cargo, but the *Aimable* sank for good on March 7, taking its irreplaceable goods with it to the bottom of the channel.

At this point a less stubborn commander might have given up the whole project. Instead, La Salle dispatched Beaujeu and the *Joly*, along with the crew of the *Aimable*, back to France. This left him with one ship, some 200 hapless colonists and few supplies, surrounded by hostile Indians.

The next months read as a litany of failure and death. Settlers perished from illness and overwork, from eating prickly pear pads and from Karankawa arrows. One of La Salle's best men, Le Gros, was bitten by a rattlesnake. His leg was amputated, but he died all the same. By July 1685, half the ill-fated colony was dead.

With La Salle away, disaster strikes

Unbowed, La Salle built his Fort St. Louis some 30 miles inland, on elevated ground beside a small creek (today, Garcitas Creek) that flows into Lavaca Bay. Twice he took men and set out overland to explore the area. While he was away on the second journey, the Belle was lost. It is easy to blame La Salle for the catastrophe, not merely for putting the drunken fool Tessier in charge of his only remaining ship, but for being gone so long and for sternly ordering the ship's company to stay aboard the Belle at anchor until his return.

As Jim Bruseth and Toni Carrell pull off the wet burlap cloths that cover the *Belle*, I am dazzled by the array of goods awaiting excavation—the contents of the ship's storage compartments in the lower hold, lying in the gray mud just as they were stowed. A stash of nested brass pots, candlesticks and a ladle; bulbous casks with their supple willow hoops intact; coils of rope and coils of thin brass wire; a string of wooden beads that may have been a rosary; pieces of red tile, fire bricks for the galley; wooden blocks to help with sail handling; pieces of sailcloth; a box of disintegrating muskets, their stocks still recognizable.

About a month before my visit, the team found a skeleton curled within a 600-foot coil of anchor rope; it was so well preserved that traces of brain matter still clung to the inside of the skull. The man was one of the crew who died of thirst or who drowned when the ship went down. Later, in the THC lab in nearby Palacios, I held the pewter porringer (a shallow dish) that had been found beside the skeleton along with a leather pouch, shoes and buttons. The neat lettering on the blackened metal reads: C. BARANGE (the E probably bearing an implied accent aigu). No complete roster of the 200 settlers of Fort St. Louis has ever come to light, but further research might reveal this man's identity.

A difficult task facing the THC team, after the excavation of the hull, will be the preservation, and reassembly

Workers spray mud off some of the piles of lead shot found aboard. Screen ensures that no artifact is lost.

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Brass rings bearing Jesuit insignia were used for trade and religious teaching. Hundreds were found.

in a Texas museum, of the remains of the *Belle*. To my eye, it seems an impossible task, but archaeologist John de Bry's recent discovery of the ship's exact dimensions in a French archive should help considerably. Even with the ship lying ruined in the mud, the exquisite craftsmanship that went into the shaping and joining of its boards and planks and beams is evident.

I watch mesmerized as Jim Bruseth lies across a pick board and prepares to pry loose one side of a rectangular wooden box. A few days before, he opened an identical box and uncovered 650,000 tiny glass beads, made for trading with the Indians; the discovery may double the known quantity of French glass beads thus far found in North America.

As he gently lifts the side of the box loose, a solid cube of black mud appears. Using a dainty trowel, then a wooden potter's tool, Bruseth patiently scrapes away, depositing all the mud in a bucket to be screened. Abruptly, three tiny rings emerge from the mud. Once Toni Carrell has washed them off, I see a delicate cross and the letters *IHS* cast on the face of each ring. "They're called Jesuit rings," says Carrell. "These, too, were for trading with the Indians."

Moments later, Bruseth unearths a whole pile of the rings. He pauses in his work; guessing that the rings had once been strung together on a cord, he wants a draftsman and a photographer to record the cache before he liberates it from the muck.

Eventually the box will also yield many strange pieces of thin glass that may have been mirrors; thousands of tiny straight pins; and a number of wooden combs with teeth on both sides, probably used to comb hair with one side and comb out lice with the other. All the objects had been shipped from France to be used as trade goods for the Indians.

In late January, two more cannons were found buried in the forward cargo hold, four-pounders, identical to the one Chuck Meide recovered "by Braille" and just as beautiful. Now, lying on his pick board, Bruseth sums up the significance of the discovery. "It's a 300-year-old shipwreck. That's important in itself. But it's also the only La Salle shipwreck in the world. We can't afford to cut corners. We have to do this right."

"The *Belle* was La Salle's last chance," says scholar Robert Weddle. "He could never have succeeded on the Texas coast without her. His whole enterprise depended on finding the Mississippi and settling the colony there. Without the *Belle*, that was no longer possible."

By January 1687, about 40 settlers out of the original 200 were still alive. By then, La Salle had explored the area and realized he had landed far to the southwest of the Mississippi. On January 12, he set out with 17 men in a desperate effort to reach a French fort on the Illinois River and thus get a message to France to send a rescue fleet. He would be traveling a thousand miles as the crow flies, perhaps three times as far by the route he would have to cross on foot and by canoe. The party wore canvas clothes made from the *Belle*'s sails.

Within that ragtag group, there were men with quick tempers and dark grudges in their souls. In March, the group was still in Texas, somewhere between the Brazos and the Trinity rivers, when a petty dispute over the spoils of a slain buffalo lit a bonfire of revenge. Two men, Pierre Duhaut and a surgeon named Liotot, struck in the night, murdering three supposed adversaries in their sleep, including La Salle's steadfast Shawnee companion, Nika. The killers then realized they would also have to murder La Salle.

Like the plot of a Mafia thriller

On March 19, as La Salle went in search of the renegade hunters, a conspirator lured him into an ambush. Hiding in a canebrake, Duhaut fired the fatal shot. Liotot derided the commander, mocking him as the "Great Pasha," while the two men stripped his corpse and dragged it into the brush, leaving it there for wild animals to devour.

The aftermath of these murders unwinds like the plot of a Mafia thriller—or a bad Western. Taking command of the party, Duhaut quarreled with another conspirator, who shot and killed him. The conspirator's ally promptly dispatched Liotot. These two murderers then fell out and managed simultaneously to shoot each other dead.

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Months later, after untold hardship, six survivors under the leadership of Joutel reached their brethren on the Illinois River. By trading their baubles—glass beads, knives and needles, like the stuff Bruseth would unearth on the *Belle* 309 years later—all the way up the river, the party won the Indian help that allowed them to complete an epic flight through the wilderness.

Back at Fort St. Louis, the 20 surviving colonists fell into despair. Day after day, they waited for the rescue ships they assumed Louis XIV must have sent after them. The only vessels plying the gulf, however, were Spaniards hunting La Salle. So wretched and obscure had the colony become that their enemies never found the French hangers-on.

The coast-dwelling Karankawa Indians, who had uneasily borne the intrusion of the French for three years, soon learned that the colony's leader had vanished. Though La Salle, with his vast Indian experience, had always preached friendly relations and the giving of gifts, he had angered the Karankawas on several occasions. In particular, the theft of some Karankawa canoes in 1685 left a bitter taste in the Indians' mouths.

Sometime around Christmas in 1688, a Karankawa band attacked. In the massacre that followed, all the adults in the fort were killed. Last to die were Madame Barbier, wife of the fort's commander, and her 3-month-old baby; a Karankawa warrior seized it by the foot, dashing its brains out against a tree.

Yet five other children survived the massacre because Karankawa women shielded them from the slaughter and carried them away on their backs. They were taken to the Indians' village and adopted into the tribe.

On April 22, 1689, guided by a captured French deserter, a Spanish expedition at last came upon the ruins of Fort St. Louis. The Spaniards found a scene of utter devastation: doors torn from their hinges, boxes broken open, some 200 costly books strewn about and ruined by mud and rain. Nearby they came upon the remains of three victims, one apparently a woman. Fewer than a dozen of the 200 colonists at Fort St. Louis ever found their way back to Europe. Though Joutel's account remains the authoritative firsthand record of the doomed expedition, an even richer witness to the complex tragedy has all but escaped history.

In 1847 George Catlin, famed painter of the Western frontier, did this scene of La Salle being received by Cenis villagers in May 1686. At the time, La Salle was still hoping to get help from France or Canada.

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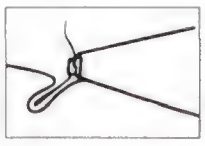

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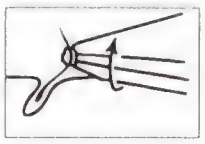

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When La Salle set off on his last march toward the fort on the Illinois River in 1687, he took with him a 10-year-old boy named Pierre Talon. The youth must have had precocious talents, for La Salle's plan was to leave him among the Hasinai—inland Indians whom the French called the Cenis—in hopes that Pierre could learn their language and an alliance could be forged to benefit France's colonies.

Pierre witnessed the events leading up to the murder of La Salle. Despite that traumatic event, he was left by Joutel among the Cenis, with whom he lived for three years, until he was recaptured by the same Spaniards who had discovered the ruins of Fort St. Louis. Meanwhile, Pierre's brother Jean-Baptiste, only 8 years old, saw his mother murdered at the fort, then was carried off by a Karankawa woman. Jean-Baptiste dwelt among these Indians for almost three years before another Spanish expedition reclaimed him.

The brothers were reunited in Mexico City, where they became the servants of the Spanish viceroy. When still teenagers, they were impressed into Spain's navy. In 1697, their vessel was captured by a French warship near Havana. After 13 years of the most extraordinary adventures and vicissitudes, the brothers regained France.

In Brest in 1698, the French minister of the navy, Louis Pontchartrain, ordered the debriefing of the Talons. All that has come down to us of their matchless knowledge not only of La Salle's debacle but of the lifeways of the Cenis and the Karankawas is contained in a brief document known as the "Talon Interrogations": 17 questions from Pontchartrain, and the brothers' paraphrased answers.

In their youthful imprisonment, the two boys lived as Indians, learning to speak the languages and taking on the mores and myths of their captors. When the Spaniards recaptured them, they wore the traditional facial tattoos. Even in its sketchiness, the "Interrogations" forms a tantalizing document. Jean-Baptiste, for instance, describes going hungry for three days while the Karankawas feasted on the bodies of rival Indians whom they had killed; yet he avers that his captors never ate Frenchmen. Jean-Baptiste left a brief word list of Karankawa terms. It remains a kind of Rosetta stone for linguists, since the Karankawas were hunted to extinction by Texans in 1858, before any scholar had ever walked among them.

Anthropologists and historians wring their hands at all the questions the Talon brothers might have been asked. But the interrogators impatiently turned from Indian matters to press the brothers on the location and wealth of Spanish mines in Mexico.

It is worthwhile pondering the "what might have been" of La Salle's colossal failure. Had the explorer's grand scheme succeeded, North Americans from Mexico to Canada, rather than merely the inhabitants of Quebec, might be speaking French today. The threat that La Salle posed stimulated Spain to explore the entire Gulf Coast and to establish settlements in Texas. It is not entirely far-fetched to trace such momentous events as the Louisiana Purchase in 1803 and the Mexican-American War of 1846 to La Salle's debacle.

René-Robert Cavelier, Sieur de La Salle, has no grave in the New World. The site of La Salle's death, even, is difficult to pinpoint on a map. For years historians argued over the location of Fort St. Louis. But last summer, eight iron cannons were found buried in yellow clay near Garcitas Creek, a proof that La Salle's fort had at last been found. Now with the rediscovery of the *Belle*, as Jim Bruseth notes, "it's as if we have a whole new book on La Salle." Barto Arnold, who found the wreck after searching for 17 years, puts it differently: "La Salle comes alive again. I feel as though I'm reaching across 300 years to shake his hand."

Cynosure of exhibited *Belle* treasures now traveling in Texas is a perfectly preserved bronze four-pounder.

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By Jay Stuller

Golf gets back to nature, inviting everyone to play

Using natural landforms and native grasses and plants, golf course designers are creating links that are environmentally up to par

At Cloverdale Golf Club, native alders frame what could become strokes of genius on the fifth green.

Opposite: A barn and a natural lake grace the ninth hole of the former Washington dairy farm.

Standing at the tee of Cloverdale Golf Club's ninth hole on a summer evening, one can't help but absorb the surroundings. On the verdant floor of the Stillaguamish Valley, you're enveloped by the foothills of Washington's Cascades, off which reflect twilight hues of sage and purple. To the left, screened by cottonwoods and maples, is the valley's namesake river. Ahead, on a rise behind the ninth green, is a classic red barn. The pastoral quiet is broken only by the screech of a nearby eagle.

Such reverie must pass, for the 390-yard, par-4 hole demands a golfer's full attention—if only because about 80 yards shy of the green and to the right lurks a hazard that might take the "Tiger" out of Eldrick Woods, the wunderkind of the professional tour. "It's the lagoon," says Cloverdale co-owner Cynthia Witscher. "Although it's dry now, at times we've had to tell city folk they shouldn't go in there looking for lost balls. You see, on a dairy farm, a lagoon is where you store the barn's washed-down manure."

It's unlikely Cloverdale will ever host a pro tournament, because it bears little resemblance to meticulously manicured courses such as Augusta National, Pebble Beach and Pinehurst. Its fairways are bumpy and rugged. Tufts of thick canary grass dot the rough. Skunk cabbage sprouts from wallows near several holes. Its clubhouse is a shed adjacent to the barn.

The "Green Acres" look is authentic, because until

Photographs by Michael Melford

In the off-season, joggers follow boardwalks over the marshes and meadows of Squaw Creek. The golf course opened in 1992 and became a case study of low-impact design in an environmentally sensitive area.

three years ago, Rick and Cynthia Witscher did indeed keep a herd of holsteins on this 150-acre spread, just outside the town of Arlington, 60 miles north of Seattle. "In 1988, we were the Snohomish County Dairy Family of the Year," explains Rick. "But milk prices were the pits; we were losing our shirts. So we decided to grow bent-grass turf for the golf and landscape industries."

While farmers understand grass, the Witschers knew little about golf—except that turf buyers kept wanting to hit balls at the greens they'd grown. Thus inspired, Rick read what he could on course design and eventually created an 18-hole layout. He placed most greens on existing rises on the river's floodplain. His fairways follow contours shaped by ancient riverbeds, sandbars and the hooves of cattle. Thickets of brush and boulders and patches of exposed sand were left in place as hazards to challenge golfers. Because the hardy turf comprises six types of native grasses, the course requires neither pesticides nor an irrigation system.

In 1996, Cloverdale hosted 25,000 rounds of golf, up from 20,000 the year before. With its low-key atmosphere (the clubhouse has an "honor box," into which players drop their modest fees when the Witschers put up their "Out Mowing" sign), the course beckons golfers of all levels of ability—and from all social strata.

A country-club showcase Cloverdale is not. But the Witschers created a course with attributes that architects often struggle mightily to duplicate. What's more, their modest operation is a refreshing counterpoint to criticisms of a sport that once seemed beyond reproach.

Even as golf's popularity soared in the late 1980s—growing from fewer than 20 million U.S. participants to more than 25 million today—the game and its fields of play have come under withering fire. "What was once accepted as a benign form of open space is under attack for its impacts on water quality, wildlife habitat and land use," explains Paul Parker, a vice president with the Center for Resource Management, a nonprofit organization based in Salt Lake City and Denver that tries to find common ground between business and environmental interests.

There are already more than 15,000 golf courses in the United States, which together take up more area than Delaware and Rhode Island combined. Since 1990, an average of more than 350 new or expanded courses have opened annually, each 18-hole course covering about 150 acres. Another 1,600 courses are planned or are under construction.

This is welcome news for hackers who must hustle to cadge scarce tee times. But the lust for new courses rais-

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es serious questions. For one thing, is carving fairways out of a forest, moving a million cubic yards of seaside sand dunes or planting thirsty Bermuda grass in desert settings—where a course can quaff up to a million gallons of water a day—an intelligent use of land? For another, is keeping courses green and free of weeds, brown spots and bugs worth the liberal use of chemical fertilizers and pesticides?

Much of this is done in the interest of the perceived perfection that's come to be known as the "Augusta National Syndrome," named for the fabled Georgia course that hosts the Masters tournament each spring. "People see this highly manicured layout on television, with wall-to-wall green fairways and blooming flowers wherever you look," says Parker. "It *is* beautiful. But the conditions are completely unnatural."

Still, this televised perfection—standards that are also nurtured by features in golf magazines and resort ads—generates expectations that oh-so picky golfers demand of designers and course superintendents. In addition, architects began designing incredibly difficult, championship-style courses, mainly to please developers out to attract professional events, or to lure guests to resorts where it can cost $100 to play a round.

"Because of these trends we've fashioned ourselves a real image problem," says Michael Hurdzan, one of the world's top golf architects. "Golf is often viewed as a sport for rich white guys who despoil the environment. That elitist image makes us a fat and easy target."

With a doctorate in plant physiology, the outgoing and thoughtful Hurdzan designs both upscale private courses and low-cost public facilities. "What isn't widely known is that the industry has put an incredible amount of money and effort into research on turf grasses that require little or no pesticides, and which need less water," he says. "We have scientific studies that prove well-designed courses don't pollute the environment. We can even make them beneficial to wildlife by reclaiming wasteland or converting old landfills into healthy spaces that are useful to a community. And courses don't have to be expensive to build or play."

A student of his professional forebears, Hurdzan also recognizes that some answers to the questions menacing golf's future rest in history, and that today's criticisms are supremely ironic given the game's origins. That's why there's a certain rightness to the Witschers' rough-and-ready golf club. Cloverdale is a course for the next century, if only because nearly everything about it suggests that it's a course straight out of the past.

Golfers tee off at Squaw Creek; the Squaw Valley, California, course uses no chemical pesticides.

"The architect of the land . . . is God"

On the fourth hole of the Old Course in St. Andrews, Scotland, Mike Mordan has just smacked a long-iron shot that's been snagged and slowed by the branch of a bush. As the Chicago pension consultant walks past the prickly brown-and-green shrub, he lightly brushes it with his hand and, with the bemused resignation so common to golfers, asks aloud: "Who put this here?"

Caddy Dave Hutchison, who for 22 years has looped bags around St. Andrews, cocks his head, looks quizzically at Mordan and pauses for several seconds.

"God," he answers. "There's nothing on this course that was made by man. Golfers play on it. But the architect of the land . . . is God."

Religion aside, there's no argument that for golfers, no piece of ground is more sacred than these 18 holes wedged between eastern Scotland farmland and coastal sand dunes along the North Sea. The Old Course site has allegedly been trod by golfers since the 1500s. And yet, no one knows who designed the current layout on this narrow strip of salt-tolerant marram grass and finer fescues cropped by sheep and cattle.

Says George Grant, who has lived all of his 62 years in St. Andrews, "Local lore has it that the bunkers were created by sheep nestling in hollows to seek shelter from storms. The sand and bunker walls have, of course, been tidied up for golf. But the story of the sheep is one I've heard my whole life."

If it's true, says Hurdzan, Scotland has the world's smartest sheep, "since the bunkers are lined up precisely to points of play." When legendary course architect Alister Mackenzie analyzed St. Andrews, he came to the conclusion that people kept hitting shots to the same spots, and by repeated play scratched the turf down to sand. "Sheep might then have nestled in the low spots,"

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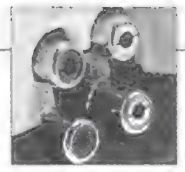

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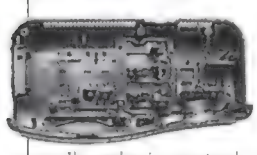

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says Hurdzan, "but the golfers developed the hazards."

St. Andrews and similar courses gave rise to a game that was shaped by the landscape, and not a game that shaped the land. This very simplicity made primordial golf accessible to the common man.

"The Scots are a thrifty people," says Hurdzan. "Their courses were laid out on a rolling terrain with little modification to the ground." Call this a necessity, since at many ancestral courses no green fees were charged for what was, after all, a shared community asset.

For a course to be enjoyable, relaxing and a test of skill, it should first offer a measure of safety. That means clear lines of sight for those striking balls, or enough space or barriers to prevent others from getting conked by a wayward shot. It should have variety, in the lengths of holes and the severity of hazards. Those holes must also have a progression and flow that keeps players engaged and the traffic moving.

Throw in the technical aspects of drainage and irrigation requirements, and the task of routing an 18-hole layout on less than 200 acres of land becomes a bit more complex than your typical course critic may imagine. Most courses require at least some modifications to an existing landscape.

"With bulldozers, synthetic fertilizers and water, architects could build courses just about anywhere," says Hurdzan. Such capabilities—driven by consumer demand—is what led to courses in deserts, sprawling layouts that anchored housing developments and plans for resort courses in spots that caused environmentalists to go ballistic. The question "Why here?" seemed particularly pertinent in 1982 when developers proposed building a course in a meadow in Squaw Valley, California.

With new resorts, casinos and golf courses in the works on the Nevada side of nearby Lake Tahoe, local officials and businessmen could hear the sound of tourist money being vacuumed across the state line. A premium resort and golf course at Squaw Valley would keep some spending on California's side.

In opposition were Squaw Valley homeowners whose residences looked out over the meadow, home to red-tailed hawks and a summertime explosion of wildflow-

In the course of researching this piece, Jay Stuller cut his handicap from a 14 to a 9. The golf gods are plotting revenge on the San Francisco author.

As designed by top golf architect Michael Hurdzan (far left), California's Desert Willow (left), a municipal course, will boast native species such as red and golden barrel cactus. Flags by fan palms (above) mark sites for plants and drip irrigation.

ers. In addition, environmentalists feared that golf course pesticides would contaminate an aquifer beneath the site and that nitrogen fertilizers would damage surrounding wetlands. Finally, Squaw Valley is often buried under 20 feet of snow; would a course that could remain open only four or five months each year be worth the risks? Legal and regulatory threats stalled the project.

But to the credit of its owners, and the Robert Trent Jones jr. firm that designed the course, the Squaw Creek Golf Resort evolved into a case study of how a golf course can have a surprisingly low impact on even a sensitive environmental area. Moreover, the Squaw Valley meadow wasn't quite as pristine as it had seemed.

"Once we started closely analyzing the property," recalls Kyle Phillips, design vice president at Trent Jones, "we learned that in preparation for the 1960 Winter Olympics, the U.S. Army Corps of Engineers had blasted out boulders and leveled a lot of the meadow for parking lots. Then, when we took samples from what was considered the valley's most vulnerable wetland, we found it was a leach field for the septic tanks of the surrounding homes. They'd been on a sewer for years, but stuff was still leaching into the marsh."

The design plan limited Squaw Creek's playing area to just 80 acres. Boardwalks carry players over marsh and meadow areas. The builders also restored acres of native grasses and enhanced natural filtration ponds for water feeding Squaw Creek.

Squaw Creek is now certified as a "Cooperative Sanctuary" by Audubon International, which has a program that recognizes environmentally compatible golf courses. But it took a decade for Squaw Creek—which finally opened in 1992—to get through a thicket of environmental opposition and regulatory problems. Time is money, and the maintenance regimen at this course is costly. A midsummer round at the resort will thin a golfer's wallet by $110.

The golf industry and environmentalists continued to spar. In 1995, the Center for Resource Management, *Golf Digest* magazine, Pebble Beach Resort, and the National Wildlife Federation organized a summit meeting. The conference brought together about 80 members of the golf industry, the environmental community and various government agencies. "You can't imagine a group of people more wary of each other," recalls Parker.

"But the participants started to find some common

The unofficial head pro at Cloverdale, Wiffi Smith proves she can golf anywhere. Well . . . almost anywhere.

ground," he continues. "While some designers contend they can build a course anywhere, I think they came to realize that there are some sites where you shouldn't build a course. Environmentalists were surprised by the amount of research the United States Golf Association (USGA) has put into developing turf grasses, into drainage systems that minimize runoff and in creating habitats that attract wildlife."

Eventually a broad coalition that included Friends of the Earth, the USGA, Sierra Club and the Golf Course Superintendents Association of America agreed on a set of principles to guide construction of new courses and maintenance of existing ones. It also admonishes golfers who complain about "imperfect" conditions, and suggests that an environmentally sound course is a quality course, brown spots, thin turf and all.

Still, many proposed courses meet feverish opposition. "Environmentalists who truly care about the ecosystem are reasonable and understand that when we create biodiversity on a golf course, our objectives are mutual," says Hurdzan. "But we still face zealots who blame all the world's ills on development and are out to stop it without bothering to see what goes into a course that's built the right way."

On a steaming September afternoon in California's Coachella Valley, Hurdzan provides an on-site analysis of a course that was built in the wrong way. At a Palm Springs area resort that shall go unnamed, the trim and relaxed architect stops the golf cart before he and his companion reach the first tee.

"A desert is one of the earth's most stark and dramatic landscapes," he explains, "and it's one that not many people get the pleasure to experience firsthand. But look around and what do you see? Concrete ponds, mounds covered with grass and decorative plants, bushes and palm trees that aren't native to anywhere within 500 miles. It's like whoever built this place tried to disguise the fact that we're in a desert. I hate to sound so picky, but there's no realism to this place, no character that makes the course memorable or puts you in touch with the environment," Hurdzan sighs. "When you see a place like this, it says 'opportunity lost.'"

Putting health back into the land

Approaching the peak of a 25-year career in which he's designed more than 200 courses, Mike Hurdzan hasn't missed many opportunities. His holistic environmental approach to design makes Hurdzan a bit different from his fellow architects, however. Today, he's involved in two high-profile projects. One is the much-watched Widow's Walk, on the site of an abandoned gravel quarry in Scituate, Massachusetts. An eyesore of dirt-bike trails and illegally dumped home appliances and tires, the quarry has long been devoid of vegetation and wildlife. "It's a chance to take a biologically impoverished site and, by developing a golf course, put some health back into the land," says Hurdzan.

Scheduled for play in mid-1997, Widow's Walk will also be an experiment, with three different types of green construction, each rigged with computerized monitors to measure soil temperature, moisture and fertility. The public course will also be planted with drought-resistant fescue grasses and other tests of maintenance practices. It will generate data that Hurdzan hopes will be of use to the entire industry.

The course that Hurdzan calls "the most important project of my life" is now under way in Palm Desert, California, not all that far from the worst-case example. Called Desert Willow, it's on a piece of city-owned land. Hurdzan is using $10 million of Palm Desert's redevelopment money to build a facility that will give resident golfers a chance to play a big-budget course at municipal prices. He's creating a layout with enough championship style to attract a major PGA tournament and designing a course that looks as if it truly is a part of this desert environment.

Trudging up the seventh fairway of the Desert Willow site—at present, little more than sand—Hurdzan stops to admire the mounding by the project's construction company. "They've rearranged about a million cubic

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yards of sand," he says, "but it all comes from this site—and the mounding is modeled after nearby sand dunes. The high ground flanking the fairways will shelter golfers from wind and create spectator areas for tournaments. We're going to plant only 75 to 80 acres in grass; the areas just off the rough will be sand."

In Desert Willow, Hurdzan has enough acreage to use several sets of tees that can challenge the pros yet make the course strategic and fun for players of all levels. "To the average golfer this course is going to look difficult," he explains, "but because of wide landing areas and 'containment' mounds that stop sliced shots from getting you into big trouble, it's going to play much easier than it appears."

What's more, the esthetics will give Desert Willow a distinctive character. "I hate courses that make you feel as if you could be plopped down in the middle of anywhere," says Hurdzan. "Here, golfers will know they've been in the desert. And with the way the course is laid out, I think they'll remember different shots, different holes—all the textures and elements they've seen."

What makes Desert Willow special for Hurdzan is that it has big-budget quality, yet will charge reasonable, public-course fees. "Public golf is the heart and soul of the game," he says, "and these are the players who've been getting the short end of the stick during the course-building boom."

Cloverdale Golf Club is the essence of public golf. For just $15 for 18 holes, a round here is time and money well spent. And what Rick and Cynthia Witscher have done—without training in golf architecture, maintenance or operations—is awe-inspiring. Laid upon their former farm is a course that's as environmentally light on the land as Scotland's ancient links.

"It was just amazing when we started mowing the pasture," recalls Rick Witscher. "As soon as we cut the tall orchard and rye grasses, fine fescues emerged, since they were no longer blocked from the sunlight. The fescues thickened the fairway turf, while the natural clover in the fields is a good nitrogen fixer. I planted bentgrass greens, but I'm going to let the *Poa annua*, an annual bluegrass, take over, because it's easier to maintain."

While a country-clubber may snicker at Cloverdale's residual agrarian ambiance, this course has a rather for-

Paradise regained: once an illegal dumping ground, Widow's Walk now flourishes as a golf course lush with life.

midable advocate in the person of one Wiffi Smith. The Witschers' unofficial head pro and adviser, Smith, who resides in nearby Darrington and makes a living teaching golf around the country, is a remarkable story herself.

In 1956, at the age of 20, Smith wrapped up a wildfire 28-victory amateur career, winning the French and British Opens. She then hit the Ladies Professional Golf Tour like a meteor, winning nine tournaments over the next three years. But injuries cut short Smith's career by the time she reached 24, an age when most pros are just learning the trade.

Smith feels right at home at Cloverdale. "What's so great is that it has an unintimidating atmosphere, which makes it a perfect place for people to learn golf," she explains. "So many beginners, especially women, are driven away from the sport before they really start, because of glares and harsh words from other players. Pretension has no place here, which makes it a wonderful place to teach."

Cloverdale attracts a diverse mix of players, from loggers to sawmill hands and farmers, even business executives who trek in from Seattle. (The whimsical "dress code" once said "no rubber boots or overalls.") While a fairly forgiving course, it has intricacies that challenge good players, adds Smith, who helped the Witschers with the routing on the back nine.

Dairy farmers who took exceptional care of their herd, the Witschers also are inclined to nurture golfers. There's a warmth at Cloverdale that can't be purchased at any resort. "When I first started playing," says Bob Dunbar, who supervises a local sheet metal fabrication shop, "I kept finding hot coffee and doughnuts sitting on a bench by the fourth hole. At first I thought someone had left them behind. But it was Rick, just bringing treats to regulars."

On a summer evening, from a high-backed wooden chair in front of the clubhouse, one can see in the distance a threesome teeing off on the ninth hole, tiny figures on a piece of land that looks largely untouched by man, save for the 18 red flags that flap in a gentle breeze. While dusk approaches, the players appear unhurried. In fact, they've paused to drink in the emerald surroundings, to savor the same sensations that have engaged golfers for more than 500 years.

Mapping the margins

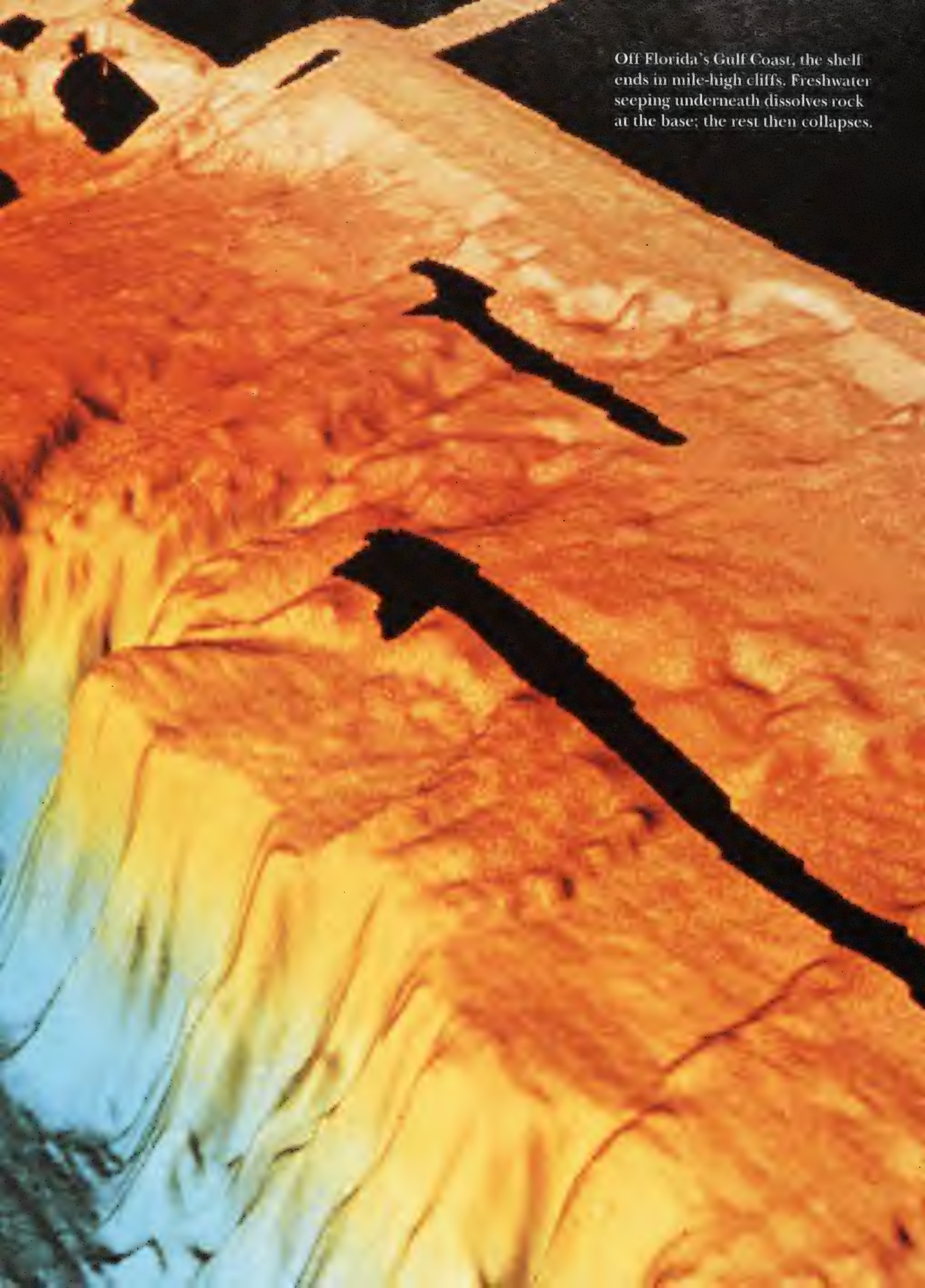
It's a violent world at the edges of our continental shelves, which could serve as a geology textbook

Plate tectonics, dissolving rock, salt gushers and plain old erosion give widely different forms to the slopes where our continent meets the ocean floor. The images on these pages provide our clearest pictures yet of what is happening where. Features as small as an acre can be seen, a resolution 5,000 times that of similar images produced from satellite data.

When the United States in 1983 extended its territorial waters out to 200 miles, surveys were ordered. Ships using multibeam echo depth sounders steamed up, down and across the continental shelves, amassing billions of data points, which were archived at the National Geophysical Data Center (NGDC) in Boulder, Colorado.

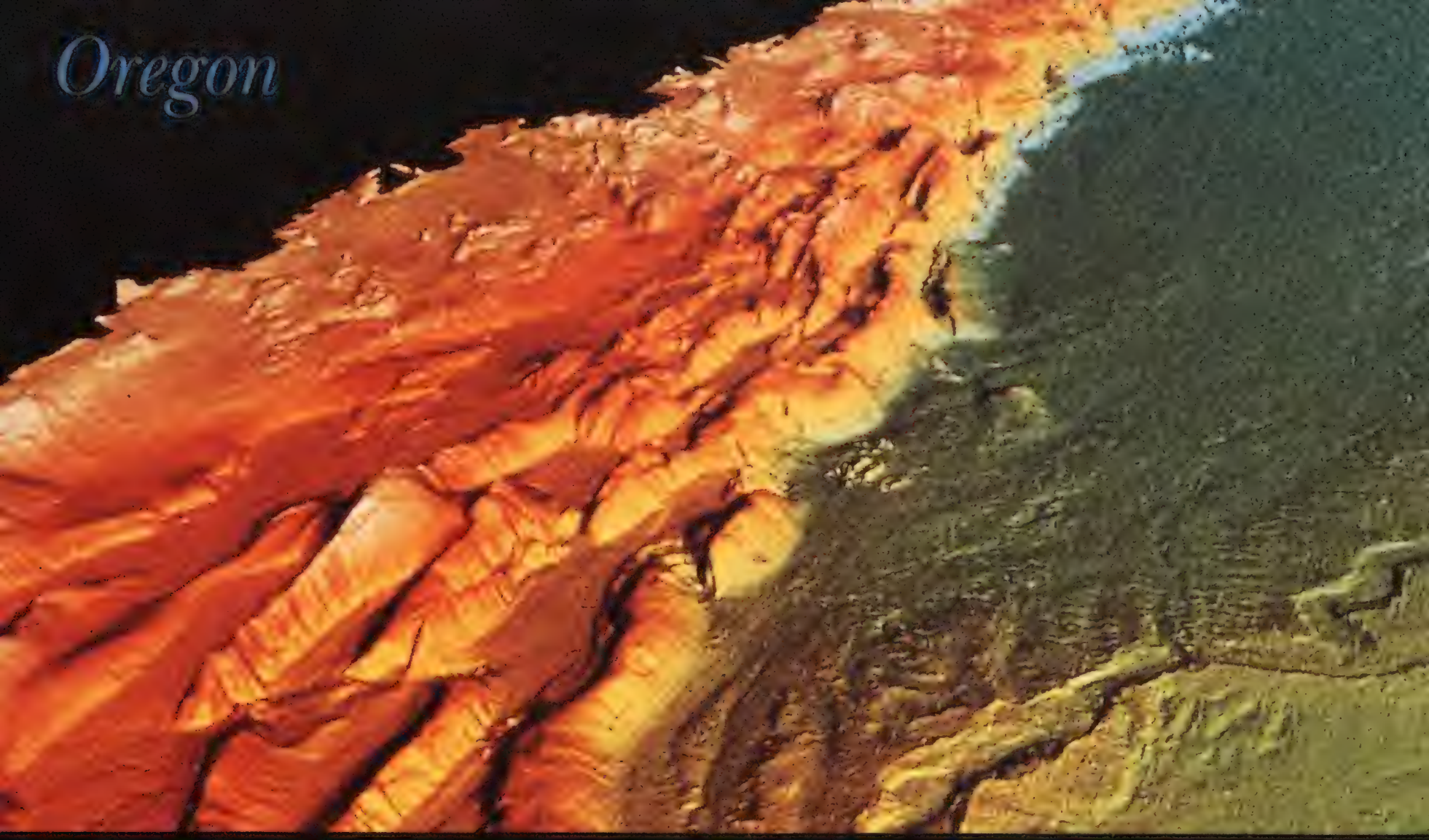
Lincoln Pratson and William Haxby, both marine geophysicists at the Lamont-Doherty Earth Observatory (part of Columbia University), then turned the NGDC information into these extraordinary underwater views. The images have been distorted by making the vertical dimension four times as high as it should be to show geological features more clearly. Black areas are those for which no data are available.

John P. Wiley jr.



Off Florida's Gulf Coast, the shelf ends in mile-high cliffs. Freshwater seeping underneath dissolves rock at the base; the rest then collapses.

Oregon

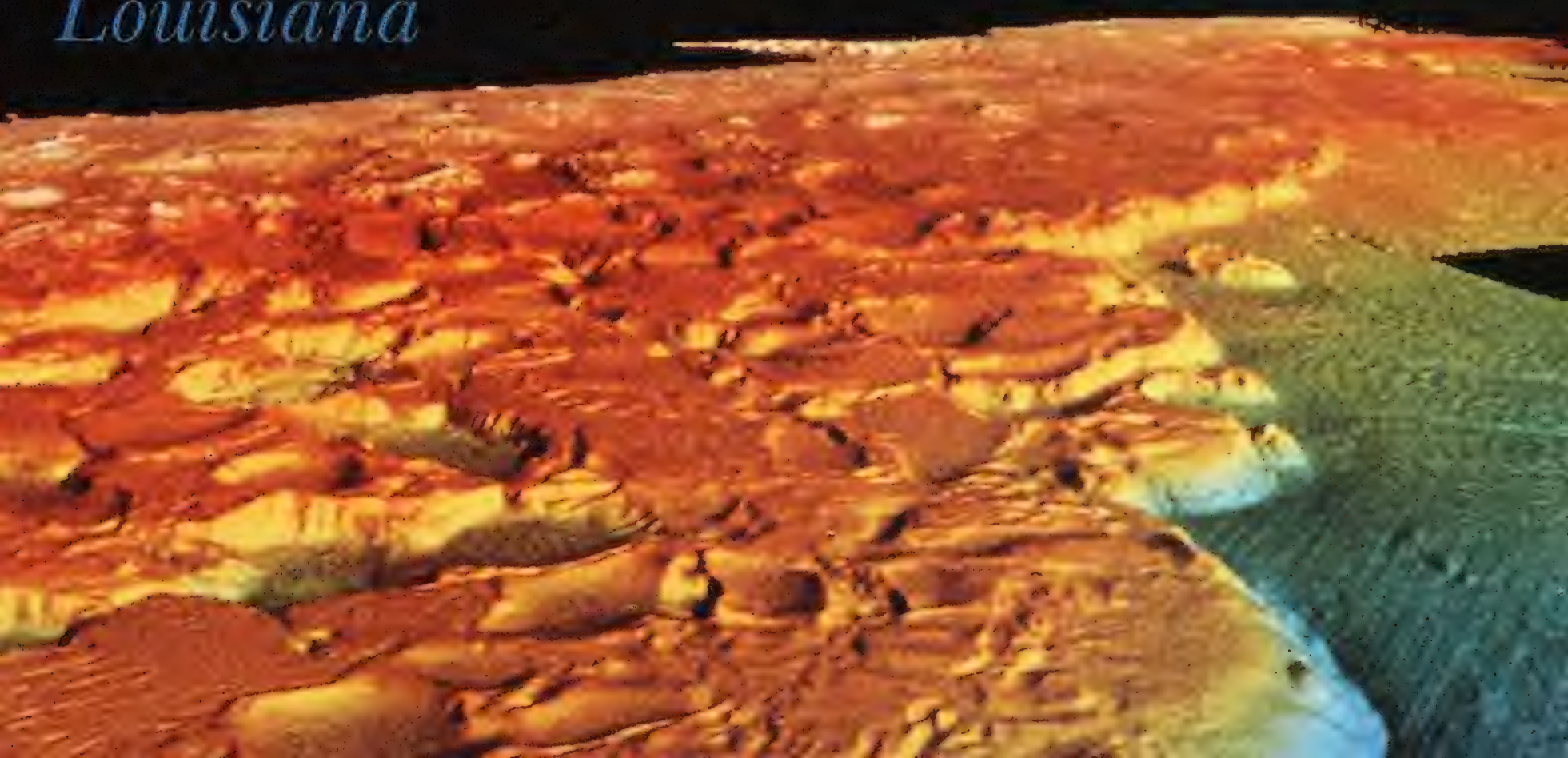


Looking southward offshore from Oregon (above), oceanward is right, landward is left. The Juan de Fuca Plate, at right, covered by a smooth layer of sediment, collides with and is pushed under the North American Plate. As this happens, sediment is scraped off and piled up in ridges on the North American Plate.

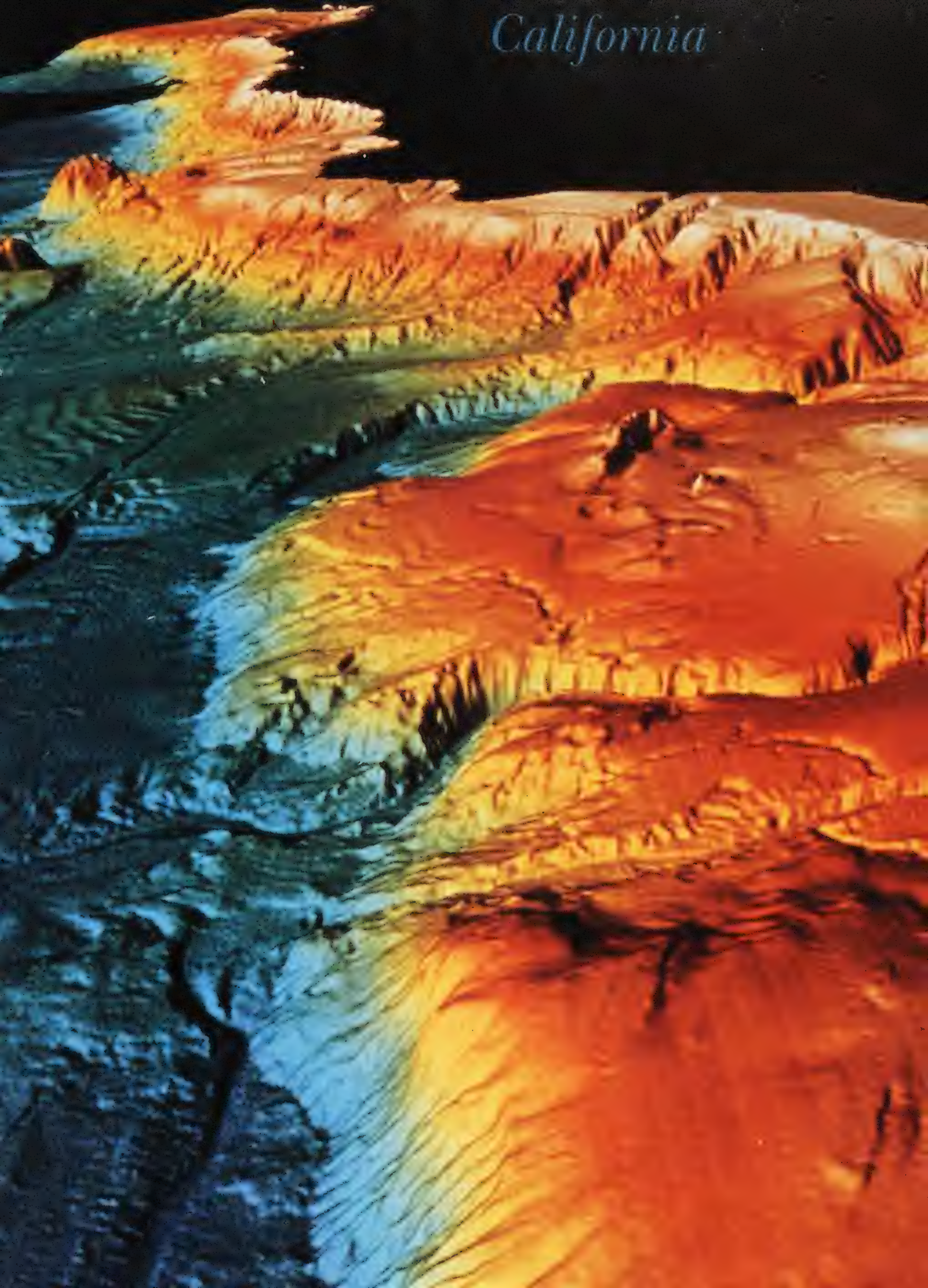
Sediments have come down the Mississippi River and covered layers of salt at the bottom of the Gulf of Mexico (below). We are offshore, south of Baton Rouge, looking northeast toward Pensacola, Florida. Craters form when salt resists compression, mushrooms upward and collapses. Salt also makes the sediment edges bulge.

Looking north from Point Sur to Humboldt Bay (opposite), we see a series of submarine canyons. San Francisco is in the black area near the top. Notice how, in some places, the continental slope appears to bulge out at its base. This occurs as the Pacific Plate, which underlies the area, slides past the North American Plate.

Louisiana



California



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By Eric Wikramanayake

Everyone knows the dragon is only a mythical beast

But try telling that to the people who live on a few islands in Indonesia where several thousand real dragons subsist in the wild

Alertly flicking its forked tongue, a brawny Komodo dragon "tastes" the air for a hint of prey or carrion.

It looked like something straight out of *Jurassic Park.* The setting was a beach at the edge of Slawi Bay on the island of Komodo in central Indonesia. The action took place a mere 20 yards or so from where I stood. A giant lizard had attacked a large mammal, driving it into the surf and slashing the tendons of its hind legs. Now it was moving in for the kill. Eons have passed since the Age of the Dinosaurs, when enormous reptiles were the hunters and mammals the hunted, but this was no Hollywood reenactment. The "monster" was a Komodo dragon, its victim a Sunda deer.

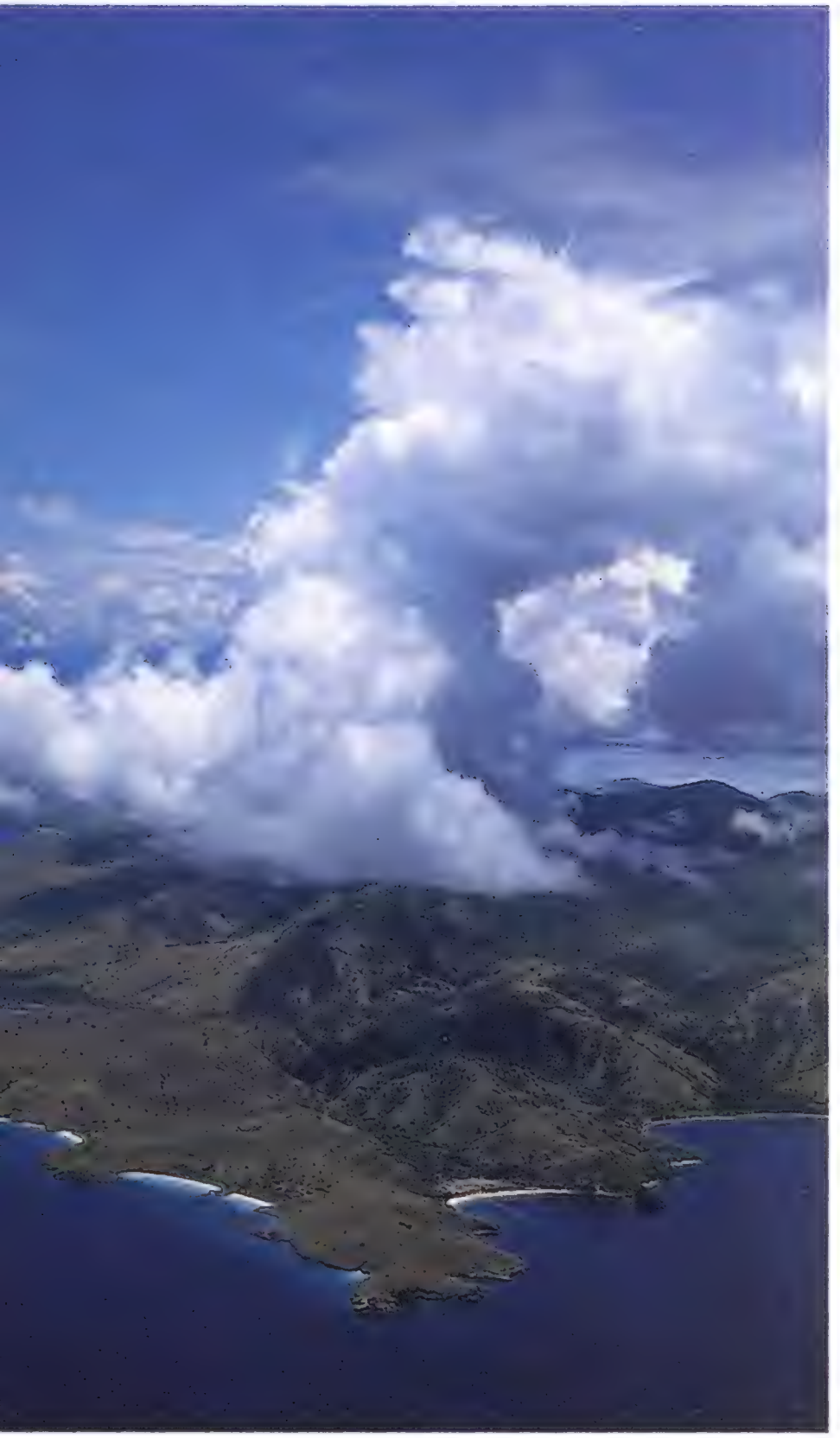
The dragon is the largest lizard in the world. It can grow to a length of nine feet or more and weigh as much as 200 pounds, after a good meal. With its serrated teeth, powerful claws and surprising quickness, it is a formidable predator. The origin of its fabulous name is unclear, though it owes much to human imagination. It could be that the first people who saw the impressive reptiles—perhaps Chinese fishermen hundreds of years ago—called them dragons because of their size and the yellow forked tongues that shoot out of their mouths like flames. Certainly early Westerners in the area, greatly exaggerating the dragons' size and power, used and gave credence to the name.

The Smithsonian's National Zoological Park (NZP) sent me to Komodo to study the dragons' ecology and find out what makes them tick. The project was conceived several years before I came on board, when Dale Marcellini, then the curator of herpetology at the NZP, visited the island in 1988 to accept a pair of dragons as a gift from the Indonesian government. While he was there, Marcellini saw a lot of adult dragons but few juveniles. That raised a red flag. If young ones were not growing up and breeding, the entire population could crash. One of my objectives was to assess that situation. Another was to find out what it is about the hardy dragons that has enabled them to survive in an environment that apparently is inhospitable to big cats and other mammalian predators.

To learn how the big predators are able to survive, the author trapped and studied them on Komodo Island.

Komodo is one of only four small islands on which dragons live. The others are nearby Rinca, Gili Motang and Flores. All are part of the island chain, just east of Java and Bali, called the Lesser Sundas. You can pick out Flores in an atlas but could be hard put to find the other three, unless you look closely between Flores and Sumbawa. Even this limited range has begun to shrink; whereas dragons could once be found throughout the western and northwestern coasts of Flores, the largest island, they are now confined to isolated populations there. Until recently, they also inhabited Padar, a small island tucked midway between Komodo and Rinca.

Although it is not what I would call a tropical paradise, Komodo does have gorgeous white-sand beaches. The interior landscape consists of grassy hills, steep mountains and dry savannas. The heat is stifling, but this does not deter thousands of tourists from visiting the remote island each year. One of the entertainments



A rugged landscape of mountains, hills and dry savannas, Komodo is about the size of Philadelphia.

that used to divert them was a biweekly offering of goats and chickens (dead and alive) to a throng of dragons, which proceeded to tear the animals to bits while the visitors snapped pictures. The grisly event was scrapped some time ago.

It wasn't until the beginning of this century that the dragons became known to science. After hearing rumors about 20-foot-long "land crocodiles," a Dutch civil servant (Indonesia was controlled by the Dutch until 1949) found and killed a dragon on Komodo. The skin was sent to a museum in Buitenzorg (now called Bogor) on the island of Java, where the animal was scientifically described and named *Varanus komodoensis*. Soon thereafter, colonial and native rulers of the area made it illegal to hunt or capture dragons without permission. In 1928, Komodo was officially proclaimed a wilderness area, one of the first in Asia. Today the dragon is classified as an endangered species in part because its range is so small—the smallest of any large carnivore in the world. Indonesia has protected this critical habitat by designating most of it a national park, and the dragon itself is revered as a national treasure.

At present there are an estimated 3,000 to 5,000 dragons at large in the wild and more than 200 living in captivity. Since 1982, captive breeding programs have augmented the world's dragon population by 157. The Smithsonian operates one such program, which was initiated with the animals Marcellini brought back from Indonesia. Dragons have been bred in captivity in three Indonesian zoos, and other zoos around the world are interested in developing programs of their own.

Not surprisingly, dragons have been the subject of much mythmaking, and tales of man-eaters are common. My own experience on Komodo, as well as that of other researchers there before me, leads me to believe that the creatures are unlikely to attack humans. Nevertheless, there are perhaps a dozen more or less reliable accounts of people being killed or eaten by dragons. One of them describes how a woman engaged in a desperate tug-of-war with a dragon when she tried to pull her child from its clutches; the dragon won.

Perhaps the best-known incident involved a Swiss baron, Rudolf von Reding Biberegg, by name, who went for a hike one day in 1974 with several friends. At one point the baron, who was 78, sat down to rest, waving the others on. He was never seen again. His companions launched a search and found only his camera. Naturally, dragons were blamed for his death.

Whether the baron really was killed by dragons will probably never be known. The possibility can't be ruled out. Another scenario, perhaps more likely, is that one or more of the creatures happened upon the poor man's body after he died or was seriously disabled by a stroke or accident.

Although dragons might occasionally be tempted to make a meal of a small child or sleeping adult, humans clearly are not a main item on their menu. Walter Auffenberg, a zoologist from the University of Florida who spent over a year on Komodo, Padar and Flores studying dragons, observed that they eat poisonous snakes, birds, small mammals, deer, pigs, water buffalo—and other dragons. They are also known to be scavengers and can be seen lumbering along the beaches looking for dead fish and other carrion.

How do they kill large prey? It's generally believed that, camouflaged in the brush, they lie in wait along

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This jacket actually helped Wichita warm up to performance art as part of a project developed by Brenda Jones and her high school art class.

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Working with a state dance troupe and contemporary music ensemble, Ms. Jones' class created a visual environment for their outdoor performance site in the Flint Hills of Kansas. They then made a floor-length jacket which the audience could pass around and wear as a way to participate in the art "happening."

For her mind-expanding approach to teaching the infinite possibilities of the arts, State Farm is proud to present Brenda Jones of East High School in Wichita with our Good Neighbor Award, and to donate $5,000 to her school. After all, who else could cover so many arts with just one coat?

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game trails until a pig or deer wanders by, at which point they rush it and bring it down or, more likely, wound it so badly it dies soon thereafter. In that case, death may result from loss of blood or from infection caused by the bacteria contained in the dragon's saliva.

While ambush is a common tactic, dragons are active hunters, too. I was out in a woodland one day when I saw a small one, maybe 1 or 2 years old, scampering across the landscape with an adult in hot pursuit. The small dragon made a wide half-circle, which put it on a course heading directly toward me. It then scrambled up a large tamarind tree about 30 feet away, barely escaping the jaws of the adult. The large dragon, unable to climb after the smaller one because of its considerable bulk, stopped short, looked up in the tree for a moment and then ambled away.

I witnessed other instances of active predation. For example, I saw dragons digging for eggs in the mound nests made by orange-footed megapodes, chicken-size birds found in southeastern Indonesia and Australia. The nests, which can measure more than 20 feet in diameter and about three feet in height, consist of sand and dead and decomposing sticks and leaves. The heat produced by the composting vegetation incubates the eggs. The birds tend the nest by moving and kicking the nest material with their feet to make sure a proper temperature is maintained.

Unlike orange-footed megapodes, dragons don't tend to the eggs in their own "nests," which usually are burrows dug into hillsides or dry stream banks. However, some females appear to stand guard for a short time after their eggs are laid—and there is good reason to do so. Among the potential raiders they have to fear are other dragons intent on digging up the eggs or eating the young as they emerge from the burrows.

There isn't much good information on when dragons become sexually mature—an ironic testimony to how little we know about the world's largest lizard. They probably start reproducing when they're 5 to 7 years old. The animals mate during the middle of the dry sea-

Rangers roasting food at their base camp on Komodo react with caution to the appearance of an unexpected guest. Dragons are not usually aggressive toward people, but they can be curious when something smells good.

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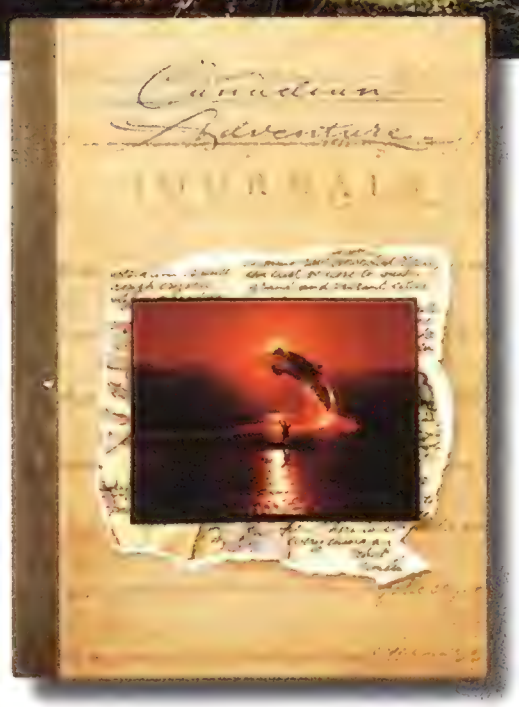

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son, which extends from May through November. The female lays from 15 to 30 eggs, which incubate in their burrow throughout the wet season (from late December to April) and hatch soon thereafter.

The newly hatched dragons head for the trees and stay in them until they are about four feet long. They feed on insects and small lizards and, for safety's sake, make only occasional forays onto the ground. The beautiful orange, yellow, black and white markings of the hatchlings make them cryptic; they are extremely hard to spot until you figure out where to look for them and gradually develop a search image. This is the reason Dale Marcellini failed to see many juveniles during his brief visit.

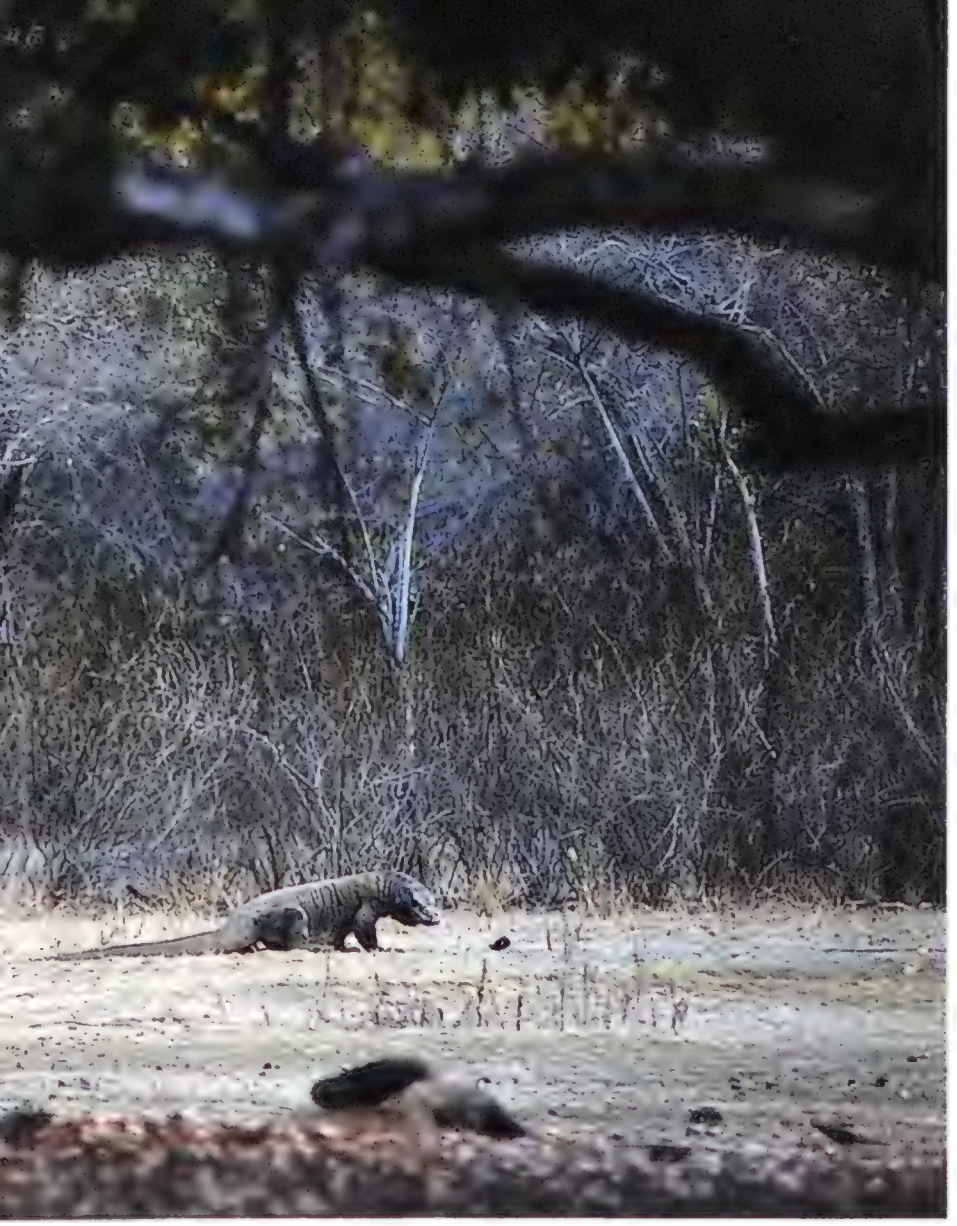
I found my first hatchling by following tracks in the sand that led to a tree. I inspected the tree carefully and spotted the baby dragon, still displaying an umbilical scar, clinging to a branch. If it weren't for the fact that I'd had prior experience searching for lizard hatchlings in Asia, I might have missed it. After that, I spent a lot of time looking up into trees, and I did see many baby dragons. I also set out baits that attracted several juvenile animals, which appeared to be 1 to 3 years old. This was further evidence that the dragons were reproducing and that the young were growing up to become part of the adult population.

The ancestry of the Komodo dragon dates back to the Miocene, about 15 million years ago. For a long time, experts differed about where the genus *Varanus* originated. Of the 40 or so species in the genus, commonly known as monitor lizards, about 30 live in Australia. That led early researchers to conclude that monitor lizards originated in Australia and subsequently moved across numerous sea straits, island-hopping westward into Asia and Africa. But the German herpetologist Robert Mertens argued that the genus probably originated in the Indo-Australian archipelago, of which the Lesser Sundas are a part. Chromosomal analysis has supported Mertens' contention. Furthermore, geologic evidence points to the likelihood of a collision between the archipelago and the Australian landmass after *Varanus* evolved, which could account for the genus's present distribution.

The dragon was by no means the only large reptile on the loose in those times. Huge crocodiles, tortoises and snakes roamed the Pleistocene landscape, as did the 20-foot-long, 1,300-pound giant monitor lizard *Megalania prisca* in Australia. But the reign of the giant reptiles had drawn to a close. Mammals, which until the extinction of the dinosaurs were small creatures cowering in the undergrowth, had already made their evolutionary move. Enormous saber-toothed cats, bears and lions

The author, an ecologist, is a citizen of Sri Lanka. He was educated in this country and has researched wildlife all over the Indian subcontinent and Asia.

Several dragons converge on a clearing. The normally solitary creatures can grow more than nine feet long.



Dragons swarm over a goat carcass that was hung out for them, a practice that ended a couple of years ago.

were the top terrestrial predators everywhere, except on those several islands in the Lesser Sundas where the Komodo dragon continued to reign supreme and where, except for humans, it still does.

No one knows how dragons have been able to thrive in an environment where mammalian predators apparently never gained a toehold. Some scientists have theorized that the prey base could be too small to support mammalian carnivores but is adequate for dragons, which don't need as much to eat. One question is, *why* don't they need as much? I was hoping a study of their thermal ecology would provide some answers. I wanted to find out how dragons use different habitats—burrows, shade and open areas—to help regulate their body temperature and how body temperature relates to their energy demand and behavior.

How to take a dragon's temperature

Using a temperature-measuring radio transmitter about the size of a matchbox, I planned to monitor the core body temperature of about 20 dragons continuously for a few days while they went about their normal activities in the wild. The same kind of transmitter could help me find out how the air temperature immediately surrounding a dragon, its microhabitat temperature, affects its core body temperature.

I set up an elaborate system that would enable my field assistant, Daadi, and me to trap the animals, glue an external transmitter onto their backs and then "feed" them a second transmitter hidden in some bait. It sounds easier than it was.

To capture adults, we built a long wooden box with a trapdoor in front and a hatch about one foot square on top, about where I expected the hind legs of an adult dragon to be. The hatch enabled us to reach in and glue the transmitter to the dragon's back without having to take the animal out of the trap or restrain it—tasks I didn't even want to think about.

The first time we used the trap, we placed it on a dry streambed littered with leaves. We baited it with rotten fish and found a place on the bank where we could keep an eye on it. Several hours later, we heard leaves rustling. Then we saw an adult about eight feet long heading straight for the trap. Instead of going in, however, the animal undertook a cautious investigation that lasted 15 minutes. It walked around, poked its snout between the planks, climbed on top. Finally it entered and the trapdoor snapped shut.

When I slid open the hatch, I discovered a flaw in my plan. I hadn't counted on a large adult being able to turn completely around in such narrow confines, but that's what this one had done, and consequently its head was too close to the hatch opening. I would have to risk a face-to-face encounter with the animal if I tried to

After emerging from egg (above), hatchling will spend most of its time in a tree with other juveniles (right) to avoid big dragons.

reach in and attach the transmitter above its pelvic area, where I wanted it. I decided to close the hatch and brainstorm for a few minutes.

Finally Daadi and I came up with a solution. Using a couple of short, stout poles as tools, we stuffed a plastic tarpaulin between the front part of the dragon's body and the sides of the trap and wedged the poles inside for good measure. With the dangerous parts of the dragon thus secured, I felt safe enough to reach in and glue the transmitter onto the creature's back.

We waited a half-hour to give the glue time to dry, then looked in and discovered that, notwithstanding our elaborate safeguards, the dragon had turned around yet again. The poles were broken and the tarpaulin was dislodged. I was glad our prisoner had waited until I was out of the way before it decided to move.

We got the hang of it after a while, and soon more than 20 dragons were crawling around Komodo with transmitters on their backs and in their digestive systems, where they remained for only a few days before being expelled. Meanwhile, my partner and I scurried around keeping track of them with our radio antennas, collecting temperature data and recording the creatures' daily movements.

The savanna is the most common habitat on Komodo. The tall grasses provide food and cover for Sunda deer, the dragon's primary prey. The drier savanna is studded with lontar palms, tall trees with giant fan-shaped leaves; tamarind and stunted jujube trees are scattered throughout the moister grasslands. Tropical monsoon forests, dominated by tamarind and kapok trees, are typically found at the base of hills and along the streams and gullies that run down the steep hillsides. Cycads and ferns complete the aura of primitiveness. The only sounds are the creaking of palm leaves, the crashing of waves on the shore and the loud squawks of yellow-crested cockatoos.

Daadi and I usually headed out to a study site around 5 A.M. We walked as much as possible along the beach. It was pleasant at that hour. The air was still cool, with light breezes blowing in from the sea. The sky gradually got lighter as the sun rose, and by the time we had to head inland it was getting warm. We often had to fight our way through scrubby vegetation to reach our destination, but sometimes we were able to walk through a grove of trees where the underbrush was sparse.

The first order of the day was to search for the signal of the animal we tracked the previous day. That early, we usually located it where we had left it; dragons don't move around much at night. We took readings from both internal and external transmitters every 15 minutes throughout the day. We knocked off around 6 P.M., but if the particular dragon we were tracking remained active later than that, we monitored it until it settled down for the night. Before heading back, we tried to sneak up on our quarry to see what type of shelter it was using—brush, cave or burrow.

We learned a lot about where dragons go and what they do. Our radio-tracking data indicated that juveniles spend much of their time lying on tree branches or in tree cavities, but sometimes they take refuge among rocky outcrops on the ground. As they get older and bigger, they begin to use larger caves and nooks among boulders, or they dig their own burrows. Too heavy to climb trees, adults are most often found along the ecotone, the transition area between the tropical monsoon forest and the savanna. Our study revealed that, on occasion, dragons also make use of montane habitats.

The use of different kinds of habitats by juvenile and adult dragons is a type of behavior that commonly oc-

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curs when different species share the same range. Called "resource partitioning" by ecologists, it helps reduce competition for food and space.

On the basis of my previous work elsewhere with big lizards, I expected that our data would show that juvenile dragons increase their temperature by basking before becoming active and lower it by retreating to shade during periods of inactivity. Because of the thermal inertia associated with larger body sizes, I expected to find that adult dragons maintain a relatively constant temperature. The radio telemetry indicated that the smaller dragons do indeed raise and lower their temperature as needed. But to my surprise, we found that adults do the same thing. This is what enables a dragon to survive on about a tenth of the energy required by a mammalian predator of comparable size.

Dragon expert Walter Auffenberg calculated that an adult dragon, on the average, needs just over a pound of meat a day. Compare this with a wild dog, which needs about 6 pounds of meat a day, or a tiger, which requires about 12. Clearly a prey population that could not support a viable population of mammalian carnivores could still support a population of meat-eating reptiles like the Komodo dragon. And it appears, from our work, that one key to this evolutionary advantage is the dragon's ability to regulate its own temperature.

Because it is so keenly in tune with its environment, the Komodo dragon's long-term prospects for survival are good, but the creature does face some serious threats. The disappearance of dragons on Padar not long ago was caused by the poaching of dragon prey, and fire. Human populations on Komodo, Rinca and Flores continue to grow, exerting more pressure on dragons and their habitat. Because the villagers on Komodo and Rinca are fishermen, threats from agriculture are not great but demand for fuel wood can limit prey habitat. Poaching remains a problem, not least of all because poachers use dogs to chase deer and then let the dogs run wild and compete with dragons for prey. An added complication: poachers carry guns and Indonesia's park rangers do not, which makes the rangers on Komodo and elsewhere understandably reluctant to challenge poachers.

Threats from natural catastrophe are potentially even more devastating. The Lesser Sundas were born out of geologic cataclysms and might someday disappear because of them. Volcanoes, earthquakes and tidal waves could wipe out all or a large part of the dragon population on one or more islands.

The Smithsonian's captive-breeding program serves as a hedge against such an occurrence. Since 1992, the female of Marcellini's pair has produced 55 youngsters through two unrelated males. She is the only breeding female in captivity outside of Indonesia and Australia (although the NZP is currently attempting to mate another female borrowed from a Japanese zoo). Her offspring have been used to stock more than 20 zoos in this country and abroad with their own dragons.

Anyone who works with dragons in zoos knows how dangerous they can be, but sometimes the beasts reveal another side to their personality. Take Friendty, the big male at the NZP. When he first arrived in 1988, he had an injured right foreleg. To prepare Friendty for his weekly visit with the veterinarian, it was necessary for Trooper Walsh, a biologist at the NZP department of herpetology and a self-described "dragon servant," to

Replicating a moment from the prehistoric past, a scavenging dragon stands defiantly against the surf.

catch Friendty with a cargo net and hold him down. Friendty did not like that.

Walsh began to notice the animal behaving strangely toward him. Once it attacked him as he was cleaning its pool. Whenever Walsh walked past the enclosure, the creature tracked him with its eyes and puffed out its throat, clear displays of aggression. It was obvious that Friendty held a grudge.

Time passed. Friendty's foreleg healed and it was no longer necessary to catch and restrain him every week. Then one day Walsh left the dragon's enclosure and observed Friendty tonguing the places he had touched. That was evidence of curiosity—a good sign. Curiosity precedes familiarity. With dragons, familiarity is essential to good relations with keepers and other dragons. This is why, before keepers at the NZP shipped their female dragon to the Cincinnati Zoo for breeding in 1992, they sent some of her scat there. "It was a kind of love letter," Walsh says. The idea was to familiarize the male at the receiving zoo with the female's scent.

Walsh decided to conduct an experiment with Friendty. Every so often, when he went out of the enclosure he left one of his sweaty shirts behind, so the dragon could get a good scent from the shirt and thus become more familiar with him. After a couple of weeks, Friendty changed. He no longer held a grudge. He responded positively whenever Walsh showed up, and was more than willing to tolerate his presence in the enclosure.

Walsh and Friendty have been getting along well ever since. "He has an intelligence and an ability to communicate beyond anything I've ever seen in a reptile," Walsh says. That's high praise indeed for a dragon.

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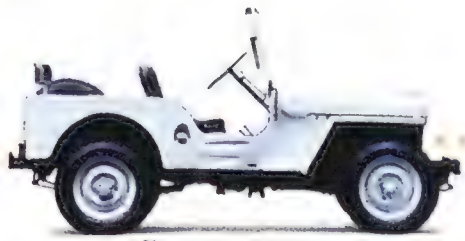

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By Donald Dale Jackson

John Barrymore: a profile in just about everything

A great actor, a shameless ham; an athlete, a drunk; a ladies' man, one of the boys—the madcap Jack had as many faces as roles

He enters singing: "A B C D E F G H I—got a gal, in Kalamazoo-zoo-zoo-zoo-zoo . . ." He glides onstage, debonair elegance oozing from every pore. This is clearly a man who has been there and back more than once, who has tasted life's wine and hung around to finish the bottle. "A man is not old," John Barrymore once said, "until regrets take the place of dreams." By that standard the Barrymore portrayed brilliantly by Christopher Plummer in William Luce's new play *Barrymore*, which recently opened in New York, is both old and forever young, a sick, burned-out and alcoholic 60-year-old matinee idol reduced to caricaturing himself to make a living while he nurses a futile dream of one last triumph.

The play presents a hauntingly accurate portrayal of the greatly gifted and relentlessly self-destructive stage and film actor shortly before his death in 1942. Barrymore was by then running on empty, his memory gone with his liver, and scrambling to pay his debts to an awesome roster of ex-wives—he called his four failed marriages "bus accidents"—and other creditors, an untidy embarrassment in the Hollywood that had once lionized him. But he could still summon occasional flashes of the old brilliance; he could still deflect pain and disappointment with a hilarious, self-deprecating wit; and he was so devoid of self-pity that in the end he seemed brave, even heroic. The drinking cronies who became his surrogate family were fiercely loyal, and one of them, the newspaperman-screenwriter Gene Fowler, wrote a beautiful biography (*Good Night, Sweet Prince*) that was at once a tribute wrought in love and a skillful job of research and writing. Barrymore's life in Fowler's telling was a string of irresistible anecdotes interrupted by plays, movies, binges and bus accidents.

Because he did his best work between 1915 and 1935, and because his films are rarely seen nowadays, Barrymore is more mystique than memory to today's audiences. His greatest performances were his stage roles as Hamlet and Richard III in the 1920s. His "great profile"—always the left side; the right, he explained, resembled a fried egg—was displayed in 57 films, both silents and talkies, the last released in 1941. At the end of his career he worked in radio, parodying himself as comic relief on the singer Rudy Vallee's radio show, which Christopher Plummer listened to as a child.

He went into acting almost grudgingly. It was the family business ("the family cul-de-sac," he called it). His father Maurice, mother Georgiana, uncle John Drew and grandmother Louisa Lane Drew were all successful actors, as were his older siblings, Ethel and Lionel (granddaughter Drew is the current Hollywood Barrymore). Jack wanted to be a painter, he said in his ghost-written 1926 autobiography, but drifted into the theater because, unlike in art, "there is hope—or at least money—for the bad actor."

Educated at schools in the Eastern United States and in England, he had no formal training in drama, and his early roles, obtained mainly on the strength of the family name, were in frothy, forgettable comedies. He was drawn more to offstage delights, notably liquor and women and the fast-track lifestyle he embraced. He began drinking as a teenager; a doctor who knew him in middle age once described him as "more or less a chronic drunkard since age 14." He drank beer, champagne, whiskey, vermouth and, when desperate, cologne and engine coolant—anything containing alcohol. Onstage he sometimes had a dresser waiting in the wings with a drink for when he exited.

Liquor caused him to miss performances and forget lines and sometimes created other problems, as on one memorable occasion chronicled by Fowler in the Barrymore material he gave to the University of Colorado at Boulder. A "rather tight" Jack was doing Hamlet on the road, the story goes, and at the curtain felt moved to address the audience. His family had performed there in Cincinnati for generations, he declared. The city was "a mecca of all art and artists," and he would never forget this night "before an audience of discriminating citizens of Cincinnati." The house was oddly silent as he fin-

The Great Profile favored his left side in publicity shots taken for a variety of plays and films over the decades, including his last silent movie, *Eternal Love* (middle right), and the 1926 *Don Juan* (bottom left).

ished. A member of the company broke the news to him: "This is not Cincinnati, it's Detroit."

Another of Barrymore's obsessions—sex—also surfaced early. At 15 he was seduced by his stepmother, Mamie Floyd, whom his father had married after his mother died. Fowler and others wondered whether this experience colored his relations with women ever afterward. He never suffered for lack of female company. "It's slander to say my troubles come from chasing women," he pointed out. "They begin when I catch them." While still a teenager trying to find work as an illustrator in New York, he had a fling with Evelyn Nesbit, the showgirl who became the central figure in a sensational murder case when her millionaire husband, Harry Thaw, killed her lover, the architect Stanford White, on the roof of Madison Square Garden.

Jack seemed to romance the actresses he worked with almost reflexively, as if it were expected of him. Tallulah Bankhead and Katharine Hepburn were two who resisted; Mary Astor was among the majority who didn't. He could also get careless with come-on lines. "You remind me of a beautiful white dove on a black velvet cushion," he purred to actress Constance Binney. "That's what you told my sister last week," she shot back. One reason for the trouble that ensued after he caught a woman, especially if he married her, was booze-fueled jealousy that sometimes led to violence. He was 28 when he married his first wife, socialite Katherine Harris, in 1910. They separated after six years.

By then Barrymore was not only an established Broadway star but a personage, a man talked about and written about, a legend in the making. They told the story of the time he was eating lobster at a restaurant and noticed that his entrée was short one claw. When he complained, the waiter explained that the crustacean had lost the claw fighting another lobster. "Bring me the winner," Jack demanded. When he won praise in a musical comedy, he was asked what he considered the prime requisite for a musical comedian. "Latent inadequacy," was his reply. He dined out for years on tales about his presence in San Francisco on the morning of the great earthquake of 1906, wearing the formal attire he had on

Barrymore, who called his four marriages "bus accidents," wed (from left to right): socialite Katherine Harris; author Blanche Oelrichs (pen name, Michael Strange); movie star Dolores Costello; actress Elaine Jacobs.

the night before and casually greeting a friend, "What's up, Willie?" amid the flames and debris. When his uncle John Drew learned that a soldier ordered Jack to clear rubble for 24 hours, his response became another nugget of Barrymore lore. He was not surprised, Uncle John said. "It took an act of God to get him out of the bed and the United States Army to put him to work."

It was his good friend, playwright Ned Sheldon, who persuaded Barrymore to venture beyond the flimsy comedy roles he had mastered and try more serious parts. His breakthrough came in 1916 in John Galsworthy's *Justice*, in which he portrayed a well-intentioned but weak-willed clerk whose love for a woman leads to a single misstep that lands him in a brutal penal system and ultimately drives him to suicide. Critic Brooks Atkinson wrote that the "lean, handsome, magnetic Barrymore [gave] a burning performance in his first serious role. . . . Barrymore cut through the darkness of the theater like a sharp, glittering penknife."

Justice launched a ten-year string of nonstop triumphs. Barrymore was in his 30s and early 40s. Strikingly handsome, intense, increasingly disciplined onstage, with an athletic body, sharp mind and ever-facile wit, he dazzled critics in one meaty role after another. In *The Jest* (1919), which Ned Sheldon adapted from an Italian play, he and his brother, Lionel, bowled over the rarely awed Dorothy Parker, who wrote that their acting "makes one forget about all the other people concerned" and that, at the end, even though the show ran long, "every member of the audience is still in his seat, clamoring for more."

It was a curious quirk in Barrymore that he could never take himself seriously as an actor, despite his talent and eminence in the family trade. Donning costumes and declaiming lines always struck him as a bit silly, even if he did it better than anyone else. He brooded about the absurdity of wearing tights the first time he was obliged to do so in a play. He regarded acting as less than manly, and he was willing to fight anyone who questioned his manliness. But his favorite tactic for deflecting embarrassment was through his ready wit. Introduced once as "America's foremost actor," he responded that he appreciated the description be-

cause "it precludes the necessity for further effort."

His boredom threshold was notoriously low. He enjoyed rehearsing, he wrote in his autobiography, because that was where actors could be creative. It was the night-after-night sameness of stage work that oppressed him. He cast about for ways to sustain his interest, like practical jokes. He would delay his entrance to make another actor squirm, abruptly change his lines, or mutter an obscenity into a fellow performer's ear. Once when an actor irked him by jabbing him repeatedly in the chest, Jack suddenly whipped off his hat and hung it on the man's finger.

He could never abide what Fowler called "bronchial excitations"—coughing—or other audience noises. In one road performance a woman giggled when he murmured his most touching, important line. He cursed, hurled a bouquet into the audience and stormed offstage, locking himself in his dressing room for 30 minutes before consenting to continue. When someone guffawed at his "My kingdom for a horse" line near the end of *Richard III*, Barrymore pointed his sword toward the offender and cried, "Make haste, and saddle yonder braying ass." Another time he glared at a cougher until the man got up and left. Barrymore was aghast when he saw that the man was using crutches.

The ex-con loved Shakespeare

Christopher Plummer, who collected numerous Barrymore stories in preparing for his role in the current play, recalled a similar experience that helped him empathize with his character. "I was doing *King John* and I noticed a man in the front row was reading the text, following the lines as we spoke them. It bothered me, so while I was doing a soliloquy with a sword in my hand I just reached down and flicked the book out of his hand. He was so mortified that he left the theater. I felt like Barrymore must have felt. I found out later that the man had just got out of prison and he was a lover of Shakespeare."

In 1922 Barrymore opened in what was widely hailed as the best interpretation of *Hamlet* ever seen in the United States. He had done a well-received *Richard III* in 1920, but with *Hamlet* he reached the theatrical pantheon, the company of such actors as Edwin Booth and Henry Irving; the only modern actor to earn such comparisons was Laurence Olivier, says Plummer. Despite the rave reviews, he grew restive and left the show after 101 performances, remaining that long only so he could break Booth's record of 100. He repeated his success in London three years later, taking 15 curtain calls on opening night and inexplicably carrying a saxophone for the 15th. While fielding questions from a group of earnest English Shakespeare buffs, the incorrigible star was asked by one woman whether in his opinion "Ham-

After scoring a huge success as Hamlet (left), the actor abandoned the stage for Hollywood, where he starred with (clockwise, from lower left) Carole Lombard in *Twentieth Century*, Joan Crawford in *Grand Hotel*, Mary Astor in *Don Juan* and as an Ahab-like character in *The Sea Beast*.

let ever had sexual relations with Ophelia." "Only in the Chicago company, madam," he retorted.

His second marriage, to socially prominent playwright-poet Blanche Oelrichs (pen name Michael Strange), lasted from 1920 to 1928 and yielded his first child, their daughter Diana. They stayed together for five stormy years before separating, "We each wanted our own way, each our own career," Jack complained. "We seemed to be exactly alike in many respects, but those similarities parted us"—aided by liquor, ego clashes and violent arguments.

He made several short films when the fledgling movie industry was still centered in New York. By 1925 he had also starred in film versions of *Dr. Jekyll and Mr. Hyde* (playing the lead without special makeup), *Sherlock Holmes* and *Beau Brummel*. But in that year, coming off the spectacular triumph of *Hamlet* on both sides of the Atlantic, he made a fateful if not totally surprising decision: he moved to Hollywood, signing a lucrative three-picture contract with Warner Brothers. Barrymore would not return to the stage for 14 years, and then it would be too late. Arthur Hopkins, who produced *Hamlet*, understood his reasons: "He loved to create, but [afterward] he was like an artist who could not bear to look again upon a finished painting. . . . His renunciation was with the full knowledge of what he was leaving. The creative part of the theater he loved. . . . Its repetition was unbearable."

It was soon apparent that the restraint and power he had refined onstage wouldn't work in silent movies. In his early films, such as *Beau Brummel*, *The Sea Beast* and *Don Juan*, he seemed to be constantly striking attitudes and doing bits of business. "I found myself making frantic and futile faces to try to express unexpressible ideas," he said, "like a man behind a closed window on a train moving out of a station," trying to convey a message in pantomime. "The silents doomed him, in a sense," Plummer believes, "the over-the-top gestures, bad tricks, the need to overdo. And it had to be frustrating that he couldn't use his voice."

But for better or worse, Barrymore would be identified with Hollywood for the remainder of his career. He would in fact be one of its most luminous stars, on a par with Chaplin and Valentino, Pickford and Garbo. He often disparaged the film capital, calling it "Bridgeport with palms" and "the flatulent cave of the winds." To a friend he wrote, "I sold my kidneys for a mess of celluloid." But he did good work there in pictures such as *Svengali* (1931), *Counsellor-at-Law* (1933) and *A Bill of Divorcement* (Katharine Hepburn's 1932 film debut).

He earned superstar wages. His income records, pre-

Donald Jackson, a frequent contributor, has written on numerous topics, including American musicals, supertwins, missing children and Robert L. Ripley.

A man of many parts, Barrymore scaled Mont Blanc and collected and studied rare books in his spare time.

served in the Fowler collection at the University of Colorado, show that he made $216,000 in 1926, $430,000 in 1929 and $460,500 in the Depression year of 1931, collecting top dollar from the MGM, RKO and United Artists studios as well as Warner Brothers. Moguls like Louis B. Mayer, Joe Schenck and Jack Warner courted him. Warner once made the mistake of going into a bathroom at a hotel suite Barrymore was occupying, only to find the tub filled with champagne bottles. "What's all that stuff for?" he inquired innocently. "Hair rinse," Barrymore explained.

Despite his formidable paychecks, he never quite got the hang of saving money. Business of any kind, banks, taxes, bills, accountants—all struck him as woefully tedious. He wrote checks for what he wanted and left the rest to his managers, whose names he had a tendency to forget. Fowler left behind a memo describing Barrymore's financial dealings as "often imbecilic. No price was too high for him to escape prosaic clashes," the biographer declared, adding that his reaction to creditors was apt to be a blank stare.

He spent, of course, with gusto, first-cabin all the way. He moved into a magnificent hilltop house in Beverly Hills and funneled money into it endlessly. Eventually his spectacular estate contained 16 separate structures (55 rooms in all), plus six pools, a skeet-shooting range, an aviary and miscellaneous fountains. He was partial to big cars, luxurious yachts, rare books and expensive clothes. He was a conspicuous consumer who knew what he wanted. His specifications for a new car—he liked Lincolns and Chryslers—noted these requirements, saved by Fowler: body cobalt blue, fenders black, wheels chrome yellow light. Leather on edge of seats Ashtabula Gold Grain Spanish. Spare-tire covers black patent leather. Small crest on doors. French horn to be transferred from old car to new one.

He fell in love almost immediately after moving West, smitten by a "preposterously lovely" young actress he spied on the Warner lot as he was about to start *The Sea Beast*, a muddled version of *Moby Dick*. He insisted that the actress, Dolores Costello, be his costar, and that their love scene be shot first. Locked in an ardent kiss, Jack ignored several commands to "cut," the story goes, and demanded that the scene be reshot four times. They married after what Jack called the triviality of his divorce from Blanche was final, and for a while it appeared that the restless and volatile Great Profile had finally found marital bliss. The couple enjoyed long, leisurely trips on their yacht and worked together at Warner before Dolores retired to raise their children, Dolores and John jr. But eventually this bus crashed like the others in a fog of booze and physical abuse, the marriage ending after eight years.

Jack worked steadily in a variety of films, returning to light comedy in *The Man from Blankley's*, churning out another rendition of *Moby Dick* and winning friendly notices as the evil hypnotist in *Svengali*. When he and Greta Garbo costarred in *Grand Hotel*, the two nonpareils treated each other with elaborate courtesy and respect, and the film was a smash. In *A Bill of Divorcement* Jack and Katharine Hepburn played father and daughter. The estimable Hepburn told Plummer years later

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that Barrymore was a generous costar—"she said he gave her the picture."

In the MGM film *Rasputin and the Empress* (1932), Jack appeared for the first time on-screen with both his sister, Ethel, and brother, Lionel. He had a mutually admiring relationship with regal Ethel, who generally disdained movie work. When a publicist on the set asked him to "tell Miss Barrymore something" so they would look animated in a photograph, Jack reacted in mock horror. "Certainly not," he quipped. "I'll ask her something." His relations with his brother were rockier and more competitive but basically friendly. When they costarred in *Night Flight*, Jack bet the director $10 that Lionel would find a way to steal a scene in which he had hardly any dialogue. He was to stand silent as Jack tongue-lashed him, then turn and leave. When the time came, Lionel dutifully turned and headed toward the door, but at the last moment reached and scratched his backside. "Now there, sir, is a brother to be proud of," Jack crowed as he collected on the bet.

Jack enjoyed physical challenges on-screen and off. In one early movie he insisted on leaping through a real stained-glass window rather than a safer reproduction. While traveling in Europe in the 1920s he impulsively climbed Mont Blanc. He became a good yachtsman, a skillful deep-sea fisherman and a hunter with a Kodiak bear among his trophies. His recurrent pattern was to do something once, satisfy himself that he could accomplish it and then forget it. He nearly overreached when he became stranded atop a steep 90-foot-high rock he had climbed off the coast of Baja California, "an inverted tooth," as he described it, "magnified to demon proportions." He finally scrambled safely down by himself after a would-be rescuer gave up and an attempt to throw him a rope was abandoned.

He had a remarkable affinity for animals, harboring among others a pet monkey named Clementine and a vulture called Maloney. He stocked his aviary with long-tailed whydahs, rollers and other exotics, and once paid a detective $25 to search for a lost Barrymore dog. Maloney the vulture would nibble food from Jack's lips, and Jack would occasionally pillage garbage cans in search of tidbits for the bird. Fowler tells of the time Jack was foraging in trash cans on a city street when a well-dressed man handed him a dime, enjoining him to spend it only for food. "God bless you, sir," Jack said. His affection for Maloney dimmed when he noticed the bird flying slow circles high above the room where he lay ill with flu. Jack "recovered just to spite him" and dispatched the ungrateful buzzard to the zoo.

His memory had begun to fail by the mid-1930s, foreshadowing the headlong physical and professional decline that would persist through his degrading final years. Jack repeatedly drew a blank trying to remember his lines and as a result began to lose work. His great fear was that he would go mad, as his father had, but in fact he was paying for decades of self-destructive alcoholism. Rejecting self-pity, he mocked himself instead. When a doctor suggested that he abandon "wine, women and song," he asked if he had to quit everything at once. "No, you can taper off," the doctor said. "Then I shall quit singing," said Barrymore. He kept working,

In 1940, Barrymore played the buffoon, but currently Christopher Plummer (right) is playing him straight.

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aided on the set by blackboards bearing his dialogue, but the quality of both the films he was offered and his performances slipped. He looked old now, though he was only in his early 50s, where a few years before he had still appeared dashing and vital. "No one," his friend Ashton Stevens observed, "can run downhill as fast as a thoroughbred."

His downhill gallop was hastened by one last bus accident, marriage in 1936 to 21-year-old Elaine Jacobs. Elaine, who in her own words "seethed with ambition," pursued him doggedly after appearing out of nowhere to visit him in a New York hospital. Barrymore recognized the danger—he told friends who tried to dissuade him that he was "going over Niagara Falls in a barrel." Five months after they wed, Elaine won a divorce decree, but they reconciled four months later, only to divorce anyway after three more years of marital combat that was noisily acrimonious even by Barrymore standards.

By 1940, when he and Elaine signed the final papers, Jack was the reeling if still charming wreck depicted in William Luce's play. He was bankrupt financially as well as emotionally; the years of money mismanagement, his dwindling earning power and ruinous divorce settlements had conspired to bleed him dry. His checks for his work in demeaning, self-parodying movies like *The Great Profile* (1940) and a similar play called *My Dear Children*—his first stage work since *Hamlet*—often went directly to his many creditors.

"Something kept him going anyway," playwright Luce says. "I think he worked not just to pay the bills but to convince himself that he still had usefulness, that he could still produce something true."

In Gene Fowler's felicitous phrase, Barrymore was now "a simulation of a bawd," a pale shadow of the glorious rake he was. "I've done everything three times," he told Fowler. "The fourth time around becomes monotonous." For companionship he turned to a colorful group of drinking buddies including Fowler, W. C. Fields, artist John Decker and Sadakichi Hartmann, an art historian notable for his gifts as a creative freeloader. They came to be known as "The Bundy Drive Boys" for their gathering place at Decker's house. Fowler's son Will, later a newspaperman and author (he is currently writing a play about Fields, called *Uncle Claude*) served for a time as Barrymore's driver-nursemaid. "I'd give him baths," he recalls. "He hated it; it was like trying to bathe a cat. And I'd take him to the studio where he did Rudy Vallee's radio show and he'd forget where we were going and escape to a bar."

Barrymore's self-restraint in public, never his long suit, evaporated. Forgetting his lines in *My Dear Children*, he ad-libbed raunchy revisions. When an actor playing his butler stood too close behind him, he snapped, "Albert, how many times must I tell you not to goose me?" Schoolteachers touring his movie set were shocked and outraged to hear him break wind. "What did you expect to hear?" Jack angrily asked them. "Chimes?"

The generation that came of age in the late 1930s and 1940s knew him, critic Richard Watts wrote after his death, "only as some strange sort of buffoon, as the subject of tasteless radio jokes and as one who cut embarrassing capers in the theater, the motion picture and the newspapers." Audiences who never saw his brittle brilliance accepted him in this new incarnation, but those who remembered saw flickers of the old magic amid the self-flagellation. To Christopher Plummer, who as a rebellious young actor yearned to be like him, Barrymore was a man "who destroyed himself responsibly and knowingly, without self-pity and without blaming others." Not a tragic figure but a great actor and entertainer "brave in the face of his own curse, courageous, and incredibly generous." Fowler, his Boswell, called him a "sweet genius" and "never once less than generous," essentially humble and gentle.

Barrymore habitually answered queries about his health by blithely claiming that he had "never felt better," but in May 1942 he entered a Hollywood hospital for the final time, suffering from pneumonia, kidney failure and cirrhosis of the liver. He hung on for ten days before dying on May 29 at the age of 60. A priest had stopped by to administer last rites, but even then Barrymore stayed in character. The priest asked if he had anything to tell him. "I have carnal thoughts," Barrymore whispered from his bed. "About whom?" the startled pastor asked. "Her," Jack said, glancing at a smiling, blushing and unlovely nurse.

Portrait of the aging Barrymore in the 1930s captures the poise and elegance he exuded on movie screens.

By Helen Dudar

The faith of the Byzantine world is alive at the Met

There was no room for doubt in the Second Golden Age, as embodied in the ivories, enamels, jewels, silks and other treasures

Amid the borrowed treasures to be seen right now at the Metropolitan Museum of Art in New York is a painted image of a blond lad. He has a stylized face you will never encounter in your neighborhood McDonald's and a long body that seems boneless and weightless. Towering over a rocky, surreal landscape, he is leaning into feathery flames that could be mistaken for a burst of red ferns, and removing his sandals on God's command to set his feet unshod on holy ground. Behind him is sky, not blue sky of course, but a lush reach of burnished gold. We stand in the presence of Moses before the Burning Bush (opposite), a *literal* presence meant to remind the believer of the power and truth of the Bible.

That unfamiliar icon exudes a familiar intensity, a fervor that may also strike us on first encountering unfamiliar or alien examples of unconquerable faith—a commanding African tribal carving of a figure of worship, perhaps, or an Edward Hicks offering of tranquil beasts in one of his beguiling celebrations of the "Peaceable Kingdom." They all insist on the possibility of life without doubt.

But the Moses icon is very old, more than 700 years old, and we will never know the artist. It is one piece amid a Niagara of rare objects to be found at the Metropolitan until July 6 under a banner that offers us "The Glory of Byzantium." That long-vanished glory demands acres of gallery space to house more than 350 pieces; they range from small coins bearing the image of Christ to immense figures that evoke those monumental mosaics that still can be seen in the vast, vaulted spaces of the Church of St. Sophia in Istanbul. There are ivories and enamels, jewels and silks, ceramic works and works in gold and silver. And there are secular treasures—an array of opulent goods offering glimpses of life in that rich, refined and profoundly devout society.

There is also a lavishly illustrated, 492-page catalog, distributed by Harry N. Abrams, that requires weight training to be lifted. Support and sponsorship for the show were provided by, among others, the Alpha Banking Group, Citibank and Papastratos S.A.

The saga of the Byzantine Empire sometimes seems more fable than history. The empire endured for more than 1,100 years, beginning in A.D. 330 when Emperor Constantine, a convert to Christianity, settled the capital of his Eastern Roman Empire on the Bosporus in the provincial town of Byzantium, which he had decreed was to be renamed Constantinople. Byzantine rule formally ended in 1453 when Turkish warriors took the great city, called it Istanbul and, in 1457, made it the capital of the Ottoman Empire.

For much of its history, Constantinople was, in the words of one authority, "the center of civilization in Christendom." Its form of worship—the Orthodox Christian ritual—and its political structures found their way to territories that would become Serbia, Bulgaria, Croatia and Armenia, and to Ukraine and Georgia and parts of what came to be Russia. The Byzantine influence at various times extended so far west and south as to embrace the entire Mediterranean basin, leaving enduring tracks through Greece, Italy, southern Spain and North Africa. Rich souvenirs of Byzantium also have been found in France, England and Denmark.

Denmark? Of all the countries of those medieval days, Denmark may seem the least likely to have found its way into the Byzantine orbit. But Scandinavians traded with the Byzantines and made the long pilgrimage to Constantinople, and Scandinavian soldiers served in an elite force that manned the emperor's royal guard. Thus, the show offers a small, finely cast silver cross and chain discovered in a buried hoard in a Danish town and possibly made many miles away in Georgia.

This reliquary cross is one small, elegant example of the sensibilities that have shaped this exhibition. At the urging of the Met's director, Philippe de Montebello, the two curators of the exhibition, William D. Wixom and Helen C. Evans, set out four years ago to demonstrate how a powerful culture not only created and sent forth its treasures, but also influenced the arts and wants of near and distant neighbors.

Two decades ago, the Met took serious note of the

Moses removes his sandals before the Burning Bush in a 13th-century icon believed to be from Mount Sinai.

Holy Monastery of St. Catherine, Egypt

A chalice made for the Abbey Church of St. Denis in 1140 included a second- or first-century B.C. sardonyx cup.

National Gallery of Art

Arresting even for art of this era, the *Stavelot Triptych* (12th century, Belgium) held relics of the True Cross.

Pierpont Morgan Library

A special reliquary made to hold a piece of the True Cross, the *Fieschi Morgan Staurotheke* dates from the ninth century.

Metropolitan Museum of Art

A frieze of holy figures encircles a vessel worked from a single sheet of gold; it was made in Georgia in 999.

Georgian State Art Museum, Republic of Georgia

Necklace is the best-preserved large piece in the Preslav Treasure, 150 objects dug up in Bulgaria in 1978.

Museum of Archaeology, Bulgaria

Probably painted once, 11th-century marble Virgin faced toward Christ in one of Constantinople's churches.

Dumbarton Oaks

earliest centuries of the empire. For this event, the show's organizers fixed on 843 to 1261, a period known as the Second Golden Age of Byzantine civilization. The first date marks the end of the cruel and violent Age of Iconoclasm: after more than a century of icon smashing (required by Emperor Constantine V, who condemned the veneration of icons as idolatry), religious imagery could again be lawfully made, displayed and worshiped.

The closing date is the final moment of five decades of occupation by the Roman Catholic armies of the Fourth Crusade; they believed that the Orthodox church did not represent true Christianity, and they also were eager to control key trade routes. On their way to the Holy Land, they had stopped to capture and occupy Constantinople in 1204, sacked the city and greedily sent its treasures westward as war booty. The loot was not simply jewelry and icons that could be crammed into saddlebags. It included four bronze horses that had once guarded the city's great field of display, the Hippodrome, and that were given a new place of honor atop Venice's great cathedral, St. Mark's.

Scouring the globe for treasures

Convenience and economy would have dictated that the museum simply forage among some fine collections at home for an exhibition. But, notes Wixom, chairman of the Met's department of medieval art and the Cloisters Collection, such a show would have merely displayed "the accident of collecting Byzantine art in America." Instead, together and separately, he and Evans, associate curator for early Christian and Byzantine art, scoured a good part of the globe, in multiple trips they can no longer count, and emerged with material from 119 collections in 24 countries.

The third member of this traveling team was Marukh Tarapor, the Met's associate director for exhibitions. She and Evans made a series of visits to the venerable Holy Monastery of St. Catherine, which has perched atop the scorched, barren soil of Mount Sinai since the sixth century; it shelters the world's richest collection of Byzantine icons and has never before sent any of its treasures beyond its walls. The Met's envoys went with a list of three pieces they wanted and the hope that the monks might perhaps agree to part with one. In the end, so impressed were the monks with the scope and ambitions of the show, they provided ten works.

One of them is the image of the young shoeless Moses. Another is a manuscript, dating from 1150, of the liturgical homilies of Saint Gregory of Nazianzos. A page from this manuscript—the signature piece of the exhibition—is an homage in dazzling color to the fourth-century bishop (p. 109). Just the portrait of Gregory alone, seated in his study, gravely bent over his writing, and drawing inspiration from the figure of Christ leaning out of a corner of heaven, would be a memorable work of Byzantine art.

Saint Andrew strides forward to receive Communion in a six-foot-high, 12th-century mosaic from a church at Serres, Greece.

Archaeological Museum, Greece

But his surroundings are astonishing. He labors at the center of what appears to be an architectural fantasy: domes and towers and pillars that seem like they could only have existed in the creator's imagination. Actually, Evans reports, the picture evokes a 12th-century monastery where one dynasty of Byzantine emperors was buried.

Another figure in the display escaped a fairly recent act of political vandalism with a heroic rescue. No visitor is likely to shuffle unseeing past the 12th-century mosaic *Deacon Stephen* (opposite) from Ukraine, a commanding image occupying seven feet of space. It is one of four mosaics on display that once shimmered high above worshipers in the central apse of the Cathedral of St. Michael of the Golden Domes in Kiev.

A mosaic of the deacon Stephen, his right hand swinging a censer for burning incense, once adorned the apse of a Kiev church.

National Architectural Conservation Area, Ukraine

In 1934, on orders from the Soviet regime, the cathedral was demolished. It was, as Evans notes, "a statement of the triumph of the state over religion." Some scholars managed to salvage a few wall pieces, and to the Ukrainians, Evans adds, those rescued works "have tremendous emotional significance." The works in the exhibition have never before crossed Ukrainian borders.

To the spectator with little experience in the period, Kiev's *Deacon Stephen* is everything we might expect from a work of that age: the figure is flat, rigid, positioned to confront the viewer face-to-face, and he wears a stern expression. Byzantine holy images seldom offer even benign glances, and if a figure suggests movement, it is perhaps merely a hand offering a blessing.

But in the same exhibition is the nearly six-foot mosaic of Saint Andrew (opposite), from the early 12th century, a work that was once part of a full procession of apostles in a Greek church that went up in flames 84 years ago. The artist has given us a saint who is simultaneously bowing in reverence and lunging forward to receive the Eucharist from a now-vanished figure of Christ. His white hair is an uncombed mess; his expression, perhaps intended to convey eagerness, instead seems grim, fiercely intent on sharing the Holy Communion.

Byzantine secular carving, especially ivories, might show bodies in the round and even allow them naughty behavior. But holy images were not intended to appeal to the senses or seize the heart. They were, in the words of one scholar, art "inseparable from theology," sacred ritual portraits that shared the sanctity of the figures they represented. As another authority, Gary Vikan, has put it, "A Byzantine Christian standing before an icon of Christ believed himself face-to-face with his Savior."

A divinely inspired portrait tradition

To the modern eye, a Byzantine image suggests a stiff, stylized figure. But in their own time, icons were true *portraits*, the faces, bodies and costumes authenticated through dreams and visions that provided models, or the features carefully duplicated, through centuries of portrait painting, from divinely inspired works. There were obvious rules. The apostles, for example, were likely to show a modest degree of both motion and emotion; sharing the life of Christ on earth made them more human than later ascetic saints who were disembodied—depicted as rigid and flat—because they had a special closeness to Christ as God.

In a culture so rich in figurative art, it is odd that freestanding sculptures were apparently almost never produced. It is thought that work of this kind was too intimately associated with pagan forms of worship that regularly and brilliantly pictured their many gods in three dimensions in marble.

What we get instead are pieces like the Dumbarton Oaks museum's *Icon with the Virgin Hagiosoritissa*, a mid-11th-century figure carved in relief on a sixth-century slab of marble (p. 103). The inscription on either side of her halo identifies her as the Mother of God. Like almost all revered figures, she stands on a platform, a common convention in paintings as well as carvings. But her gown is softer and her face wears a gentler expression than we generally see. Clearly, within the rigid conventions of the period, it was always possible for an assured image-maker to create the unexpected.

Sad to say, "anonymous" is the designation assigned to even the greatest works of that age. Why would you put names on a work that, as Evans points out, is believed to be divinely inspired? On rare occasions, a name has turned up on a piece, but it is sometimes hard to know whether it designates the artist or the patron.

***Icon with Saint Eudokia*, of marble inlaid with colored glass, is from Lips Monastery in Constantinople.**

Archaeological Museum of Istanbul

Not only did the arts of Constantinople travel far beyond the kingdom; the artists and their students found work in other territories. One of the exhibition's most striking pieces of jewelry, for example, is a tenth-century circle of gold and elaborately worked enamel, studded with pearls, rock crystal and glass.

It was part of a great cache of ancient jewelry, coins and other objects unearthed in Bulgaria in 1978 near the medieval city of Preslav. To the experts, elements of the piece look a good deal like those of another treasure of antique jewelry found 22 years earlier in Greece in the old city of Thessaloniki. In Byzantium's years of glory, that city was a commercial and cultural center for the Balkans, and expert opinion sees its famously skilled craftsmen as a possible source of the Preslav piece.

In those centuries, anyone with status and ambition hungered not only for works of art but for more status, and especially for a marital connection with the great kingdom. Neighboring princes and lesser aristocrats could apply to have a young Byzantine princess as wife; to be sure, unless he was certifiably highborn, an applicant might do no better than draw a mere royal cousin who, mind you, had not even been born in the imperial palace. Snubs were also a refined Byzantine specialty.

Everybody with gold to spare seemed to want a souvenir of the empire's artisans. The powerful abbot Suger of St. Denis, the 12th-century adviser to two French monarchs, had never journeyed to Constantinople, but he longed for art to rival the treasures of that fabled city. He finally settled for a piece in Byzantine style produced locally—in his proud description, "a precious chalice." The unknown artisan started with a carved sardonyx Egyptian cup that dated from the second or first century B.C. and gave it silver gilt mounts decorated with pearls and semiprecious stones. Incised at its base is a medallion head of Christ. Altogether, the chalice is an elegant example of Byzantium's reach.

Perhaps no other work in the show duplicates the richness of the *Stavelot Triptych* (pp. 102-103), named for the great Benedictine abbey of Stavelot in Belgium. Its abbot, an art patron and statesman, is thought to have commissioned the piece in the mid-12th century after returning from a visit to Constantinople, where he acquired the two small triptychs inside the central panel's scalloped frame. The cross of the lower triptych was said to contain slivers of the True Cross.

Since it was intended as a reliquary to house those slivers, the larger triptych is made of gold and studded with fine stones. Its wings offer six little scenes, bristling with action, from the lives of Emperor Constantine I and his mother, Empress Helena: the events that led to their conversion to Christianity, the miracles known in Christian lore as the Legend of the True Cross. These scenes, created in Belgium, are the Western answer to the Byzantine works contained in the center panel.

Byzantine society was built on stately foundations: the Greek language, its literature, and its forms of education, among other elements, were wedded to the political and legal traditions of ancient Rome. Perhaps inevitably, the mostly anonymous sculptors and painters of Byzantium also drew their inspiration from the conventions of those two powerful old societies. For example, a stiff frontal stance was the standard pose of a Roman consul, Evans notes, and it announced to the world, "I am a very important person."

The careful symmetry of much of the art was dictated by Greco-Roman rules for all existence. Art, like a life that was properly lived, demanded balance; it required *taxis*, a concept that signifies order and harmony. *Taxis*, the experts tell us, helps to explain why Byzantium

Helen Dudar lives in New York and is a frequent contributor to these pages. She wrote on the luminous work of Georges de La Tour in December 1996.

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Adam sits in dejection after his expulsion from the Garden of Eden; three-inch-wide ivory panel is from 10th-11th century box.

Walters Art Gallery

memorialized itself for so long with so little change. The opposite would have been *ataxia*, which opens the doors to barbaric disorder.

Nothing entirely explains why modern academia was for so long relatively indifferent to Byzantium, its politics as well as its arts. Edward Gibbon, England's monumental 18th-century historian, dismissed an entire millennium as "a tedious and uniform tale of weakness and misery." It may have been daunting to consider exploring a vanished culture whose people wrote in six alphabets and communicated in eight languages. Indeed the word "Byzantine" itself has come to mean something complex, intricate or characterized by scheming. Evans posits that the meaning may have come from the Crusaders' impressions of elaborate rituals that seemed designed to intimidate outsiders.

Until quite recently, the art was unfashionable, although a few discerning figures of wealth, including the great collector J. P. Morgan, admired and acquired objects that enriched the Met's holdings. But Wixom recalls that even in his undergraduate college art courses not many years ago, Byzantine art was dismissed as "boring."

To the wide-eyed traveler of the Byzantine era, there was nothing boring about the sumptuous lifestyles of the rich and ruling figures. Constantinople boasted lordly palaces, and splendid squares adorned with splendid monuments. "O how great is that noble and beautiful city!" wrote a visiting chronicler of the First Crusade. "How many wonders there are to be seen."

The wonders of the ninth-century court of the emperor Theophilos included a gold and jewel-encrusted throne and a fountain that spouted wine for festive occasions. In 949, an Italian ambassador who had an audience with Constantine VII was impressed by a court toy: a gilded bronze tree teeming with mechanical singing birds. Keeping them company nearby was a pride of mechanical lions whose jaws and tails moved as they roared.

To be sure, the recommended tourist sights did not include the neighborhoods where the poor dwelt, crammed into miserable shelters built along vaulted alleyways where the sun would not penetrate and the streets were clogged with stinking mud. Life in the countryside was hardly better. Contemporary documents fretted about the greed of the wealthy who, "like gangrene, seize upon village communities to achieve their ruin." Apparently the dues and charges that could be exacted from the peasantry were endless.

It could be a spectacularly cruel world. Blinding was the standard punishment for political rivals, heretics, traitors and magicians. Slaves were the loot of victory on the battlefield, and they were to be found laboring everywhere: in great houses and in fields, in the imperial workshops and those of goldsmiths and silk weavers.

In fact, woven silk was one of the luxurious triumphs of the city. Little of the fabric has survived the centuries, but the curators of "Glory" have been able to borrow several substantial fragments. They are lushly colored pieces with elaborate repeated imagery—one has rows of eagles, another creates a pattern out of a mythical animal with a dog's head and lion's paws.

The fabric was so valued it could be used instead of currency; courtiers were paid in silk as well as in gold. And the rules for attire could have existed only in a social order with preening confidence in its superiority. When a traveler leaving Constantinople was found to be carrying cloaks of purple silk, his bags were confiscated. Possibly no one had warned him that only Byzantine royalty were entitled to dress their bodies in purple.

The single certainty about all great powers is that they will, in time, expire. After the Latin occupiers were driven out in 1261 and a Greek Orthodox emperor was restored to the throne, not quite two centuries of Byzantium's glorious reign remained. It was a diminished glory, shrunken in territory and reduced in influence, but it still could claim accomplished artists who produced memorable art.

For its last 31 years, Constantinople fought desperately to hold off Muslim invaders. In the end, a Hungarian engineer arrived with an awesome modern invention—a massive, unbeatable cannon. It was offered first to Emperor Constantine XI, but by then his treasury was empty. He couldn't afford it. And so, in 1453, what had once been the richest, most admired, most envied place in the world fell to the forces of the Ottoman Empire. The city-state died. Its unperishable art occupied living space everywhere.

In a 12th-century manuscript from Constantinople, Saint Gregory of Nazianzos writes in his study.

Holy Monastery of St. Catherine, Egypt

By Edwin Kiester jr.

'Traveling light' has new meaning for jet laggards

From light therapy to melatonin, research into our bodies' daily rhythms has led to promising treatments for weary travelers

It was 6 P.M. in Helsinki, with stars shining brightly outside the restaurant. Unfortunately, my body insisted it was 8 o'clock in the morning and skies should be sunny. From San Francisco, we had flown for 17 hours, with three plane changes. Now we were sitting down to a hearty, traditional Finnish dinner even though my insides were proclaiming, "Time for breakfast!" Those weren't bacon and eggs in front of me, but a steaming plate of reindeer stew accompanied by a large mug of beer.

My wife and our host, her colleague from the Helsinki University of Technology, began an earnest conversation about engineering education. I listened and ate dutifully, but the dinner plate seemed to be dimming before my eyes. My lids drooped. My head slumped. My wife coughed and shot me alarming glances from behind her napkin. I straightened up abruptly. Then, little by little, my fork uncontrollably dropped toward the table. My head followed. Eyes closed, snoring gently, I came softly to rest in the plate of stew—another victim of the traveler's malady known as jet lag.

More than 425 million persons will fly internationally in 1997, and it's a safe bet that of these, a fair number of transoceanic and transcontinental travelers will suffer from the disorientation of hearing Big Ben strike noon when the body screams that it is 4 A.M. Indeed, one estimate says that more than 90 percent of long-distance travelers are stricken with jet lag, including "mega-laggers" who log so many frequent-flier miles that their bodies never get into sync with their wristwatches. The traveler's refrain, said while covering a yawn with a rueful smile, goes, "Excuse me. I'm still on Hong Kong time."

Jet lag is not always a laughing matter, though, nor is it limited to those of us jammed together in tourist class. "How many bad decisions are made by jet-lagged businessmen who fly 12 hours and then go straight to a meeting?" asks Mark Rosekind, team leader of the Fatigue Countermeasures Pro-

gram at NASA's Ames Research Center in California. The incident in which President George Bush fainted at a Tokyo dinner and vomited on the Japanese prime minister was initially blamed on Halcion, a sleeping pill he was taking for jet leg. Russian president Boris Yeltsin claimed he slept through an airport stop in Ireland and kept Irish dignitaries waiting outside the plane because of jet lag (although some critics contend that the culprit was vodka). Even the peripatetic Pope John Paul II is said to have been afflicted by jet lag.

Jet lag is a particular worry for the airlines, NASA and the military. In the post-Cold War world, rapid response forces may suddenly be called upon to fly halfway around the globe and then be thrown immediately into action. "It obviously wouldn't do for infantrymen to go on duty half asleep," says physiologist John French of the Air Force Sustained Operations Branch at Brooks Air Force Base in Texas. French has been directing a study of troops deployed to the Middle East, seeking ways to help them acclimate quickly to their new time zones.

The possible long-term health consequences to airline personnel repeatedly backing and forthing across multiple time zones have been a concern since the first jet transports went into service in the 1950s. Since almost any flight from New Zealand crosses several time zones, Air New Zealand has been conducting ongoing surveillance of its crew members. The U.S. National Institute for Occupational Safety and Health has been investigating whether female flight attendants are particularly subject to hormonal disturbances, menstrual problems, miscarriages or infertility. The study is looking at the possible effects of repeated time-zone crossings as well as cabin air quality and cosmic ionizing radiation. (Airline crews working at 35,000 to 40,000 feet do not have the shielding of six or seven miles of air that people on the ground have.)

A survey conducted by British Airways compared death rates of 446 retired pilots, most of them long-haul fliers, with others of their age group. The pilots had fewer heart attacks than their contemporaries but were more likely to die of brain tumors and melanoma, a virulent form of skin cancer. "The increase in melanoma could simply be caused by increased exposure to the sun," says Ronald A. Pearson of the British Civil Aviation Authority, which is sponsoring an expanded version of the study. Still, he adds, "there was some suggestion that the higher incidence of melanoma and other cancers might be related to disturbances of the pineal [gland]"—the tiny light-sensitive gland in the brain that plays a central role in regulating the body's clock.

It is 9 P.M. and raining in London. On the stage of the Royal National Theater, Vanessa Redgrave and Paul Scofield are shouting at each other in an Ibsen play. Their angry voices may be one reason why I remain wide awake in a hot theater after 12 hours of flying across eight time zones. Another reason may be that before departure, determined to fight off the demons of jet lag, I placed myself in the hands of Dr. Al Lewy, professor of psychiatry at the Oregon Health Sciences University in Portland. Guided by more than a decade of jet-lag research, Dr. Lewy had carefully charted a program for me to follow, coming and going. "I won't say we can completely eliminate jet lag," Dr. Lewy had told me cautiously. "But we may be able to reduce its duration by half."

While at the National Institutes of

When an exhausted body thinks it's morning, not even a hearty dinner will help.

Illustrations by Richard Thompson

Taken on a strict schedule, melatonin can help reduce jet lag. (But was that West Coast or London time?)

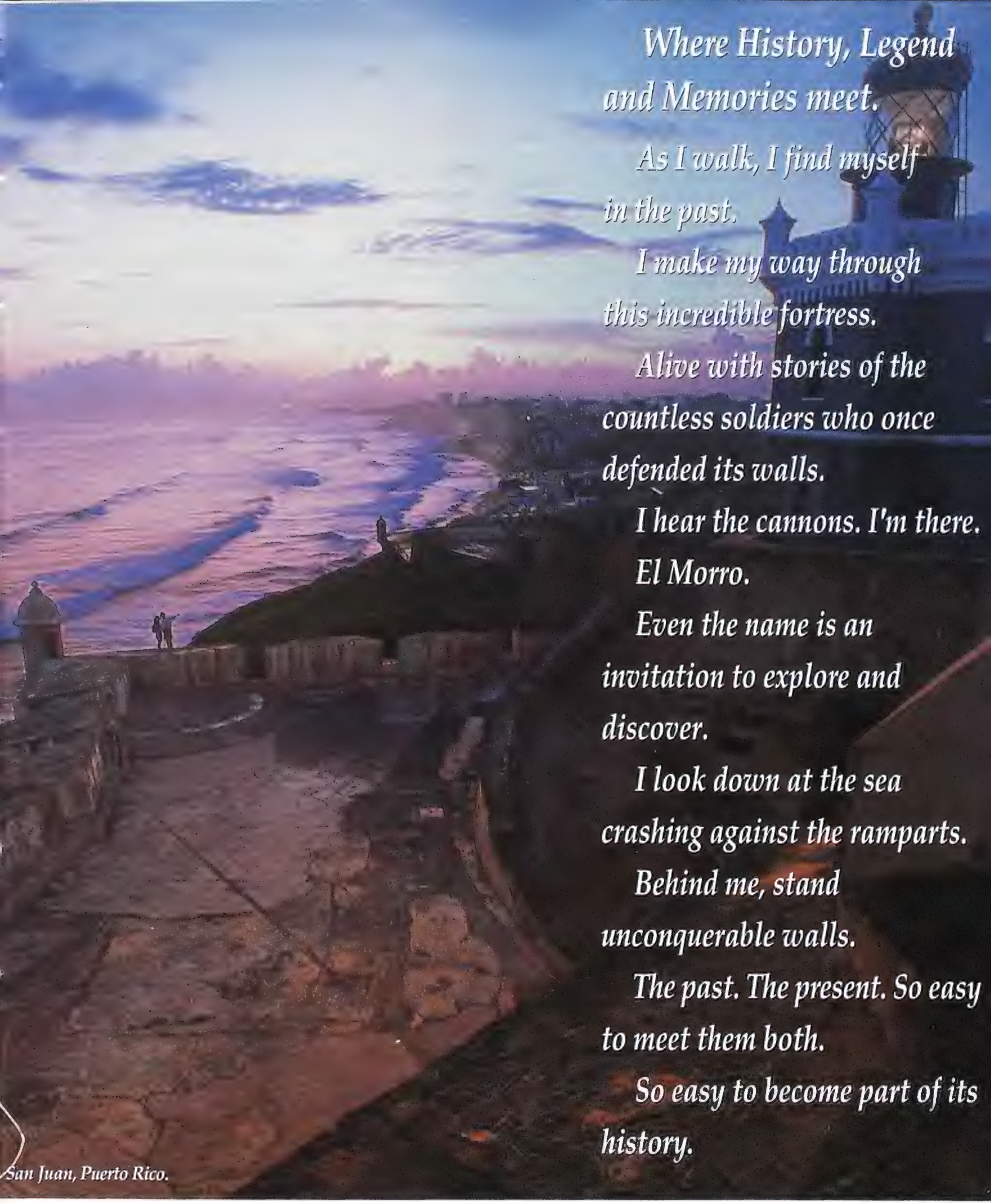
Health in the late 1970s, Lewy and his colleagues made a landmark discovery concerning how the daily cycle of sunup and sundown influences our bodies and our behavior. They found that intense light—like sunlight—can turn off the production of melatonin, a hormone that regulates our daily rhythms, including the sleep-wake cycle. Later, Lewy discovered that light can be used to treat Seasonal Affective Disorder, or SAD, a form of depression brought on by the shorter days of winter (SMITHSONIAN, June 1985).

It is now firmly established that darkness and daylight help synchronize many body functions into clockwork tempos, known as circadian ("about a day") rhythms. The sleep-wake cycle is only the most obvious of these biological rhythms. Body temperature, hormone secretion and digestive functions also follow a daily schedule. For instance, body temperature reaches its peak at 5 P.M. and falls to its low for the day about 12 hours later, between 3 and 5 o'clock in the morning. And performance tests have shown that humans are their least competent just before dawn.

The human pacemaker, Lewy explains, is located in the suprachiasmatic nucleus, or SCN, two tiny bundles of neurons in the hypothalamus portion of the brain. Light falling on the retina of the eye travels directly to the SCN, which keeps time for many of our biological rhythms. The SCN sends a signal to the pineal gland, which produces melatonin, a hormone that is released only with the advent of darkness and that stops flowing with the first rosy fingers of dawn.

Best-selling books have made melatonin, which is available without a prescription, the miracle-drug-of-the-month. Extravagant claims have been made for its antiaging, sex-enhancing, disease-fighting powers, but Lewy and other specialists in pineal research are skeptical. They believe melatonin is simply the body's darkness signal. Its secretion tells the body's internal systems that night has come and it's time to curtail operations (or, for some systems—like the release of human growth hormone—that it's time to kick into gear). A drop in melatonin tells the body that morning is here.

"When you fly across multiple time zones, you knock all these light-influenced rhythms out of kilter," Lewy says, noting that shift workers suffer a similar topsy-turvy problem. "The body has to struggle to adapt to the new schedule, but it can't make that adjustment overnight. If travelers could be patient, they would gradually adapt, but as a rule of thumb it takes one day of adjustment for every time zone crossed." No one traveling from San Francisco to Paris, Lewy points



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out, wants to patiently wait out nine days of a two-week vacation in order to adjust to local time.

That's the textbook explanation for jet lag. On both the theoretical and practical sides, certain other basic facts have emerged. Jet lag more commonly strikes on eastbound flights than on the westbound leg, perhaps because eastbound flights shorten the day while westbound trips lengthen it, and it's often easier to stay up late than to go to sleep before we're ready. Symptoms are worse on the second day after a trip than the first. Experiments have suggested that women, extroverts and night owls have less jet lag than their counterparts, while older people have more than younger folks. And jet lag is clearly highly individual and subjective. In many studies of jet-lag cures, at least 15 percent of "controls" reported they overcame jet lag just fine, even though they received no treatment. "I never heard anyone complain of jet lag on a Caribbean vacation," says a leading researcher, Josephine Arendt of the University of Surrey in England.

Because there is "no single magic bullet that works for everyone," as NASA's Mark Rosekind says, every passenger swears by his or her own pet remedy, including President Clinton. According to the White House press office, the President protects himself against jet lag by drinking plenty of water before and during the flight, and taking frequent naps on Air Force One. For the rest of us, there are special eyeshades to be worn en route, special diets, swearing off alcohol and caffeine, aromatherapy and homeopathy, and, in keeping with the times, computer software that calculates the precise hours you should sleep or go to the beach after arrival, tailored to your flight schedule. In fact, in her book *Jet Smart,* Diana Fairechild, a former flight attendant, offers "200 tips for beating jet lag," a certain indication that there is no single surefire, universally accepted miracle.

A frequent contributor (and frequent flier), Ed Kiester has nodded off into fine meals all over the world.

Although scientists respect many of these home remedies, especially the value of naps and copious amounts of water, they have primarily focused on the relationships between light and darkness and the body chemistry.

In Boston, Charles Czeisler and his colleagues at Harvard Medical School and Brigham and Women's Hospital have been demonstrating how alternating periods of bright light and darkness can manipulate the body clock. In 1978, Czeisler demonstrated the effects of light and total darkness on biological rhythms. In the '80s, he began to work out the precise amount, duration and scheduling of light exposure that could reset the human pacemaker, charting what is known as a circadian phase response curve, or PRC—scientific jargon for a graph that shows the shift in an organism's 24-hour clock as the result of exposure to clock-setting cues, like bright light, at different points of the day or night. The first scientists to plot a circadian PRC for humans, Czeisler and his colleagues found that by using bright-light treatments at certain times, they could quickly reset the body clock. In a few sessions of exposure to bright light the equivalent intensity of sunshine on a clear day, Czeisler's colleague Richard Kronauer has said, they can put a New Yorker on Bombay time.

More recently, Czeisler's group has shown that even ordinary room light can affect the body's pacemaker. By constantly measuring body temperatures in volunteers kept in relatively dim light, Czeisler concluded that even light from a hotel-room lamp may reset the body clock. According to Czeisler, this suggests that people in modern society may be forced by artificial light into a constant state of jet lag, without crossing any time zones. By the same token, he notes, if timed properly, artificial light may be used to alleviate jet lag—though not as effectively as bright light or sunshine.

In 1984, Al Lewy and his colleague Serge Daan published a paper recommending strategically avoiding light at certain times and going out in bright sunshine at others to lessen the effects of jet lag. En route to London from the United States on a typical overnight flight, for example, one might wear an eye mask on the plane, change to sunglasses on arrival and repair immediately to one's hotel room for a nap followed by several hours outdoors in bright sunshine.

Others have since followed up on the bright-light and sunglasses treatment, resulting, for instance, in a jet-lag visor that can be switched on at the correct time to shine incandescent light into the eyes, and the use of thick welder's goggles to block out light on cue. This last approach has never been popular because, as Wesley Seidel of

Oddly enough, wearing thick goggles to reset the body clock never caught on with tourists.

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For travelers jumping time zones, sleep deprivation can compound jet lag's effects.

Stanford University says, "most people would rather have jet lag than walk around Paris in goggles."

Even without the cumbersome goggles, relying on bright, natural light is not wholly practical. On my trip to London, for instance, how could I have soaked up three hours of bright outdoor sunshine when I arrived in a steady drizzle?

While still "pushing light," for the past few years Lewy has been experimenting with melatonin to move the body clock ahead or turn it back, depending on when the pill is given. "When you give melatonin in the afternoon," he explains, "the body says 'Aha! Dusk has come!' and advances the internal clock. Or, if you take it in the morning, it tricks the body into believing that dawn hasn't come yet."

Like Czeisler, Lewy is also looking at phase response curves. But rather than charting the effect of light, he has been trying to determine the exact timing and dosage of melatonin that will move the clock backward or forward. Lewy's goal, at least partly accomplished, is to work out a formula that can help us poor souls leaping sleeplessly across time zones.

Thus, before my takeoff from California, Lewy reviewed my flight schedule and carefully calibrated the timing and amounts of melatonin that might help me fight my old nemesis. After ascertaining that I was in good health and had consulted my doctor, he recommended six days of melatonin over the outbound leg of my trip and the same for the homeward leg.

On the afternoon before the departure day, I was to take a half-milligram of melatonin, followed by another half-milligram on the day itself. Arriving in London, I was to take three milligrams at bedtime, another three milligrams the next night, and still another three at 8 P.M. the following night. The next two days I was to take a half-milligram at 5 P.M. one afternoon and at 3 P.M. the next. Returning, I was to take a half-milligram upon waking on the day before departure and on the day of departure itself, three milligrams at bedtime back in San Francisco, and three milligrams at bedtime the following night. If I woke in the night after midnight over the next several days, I was to take a half-milligram, but not after 5 A.M.

My wife, who has never been as roundly victimized by jet lag, was to avoid melatonin and serve as a control. We would compare results when our trip was over.

It is 9 A.M. in the English countryside and two days before our return flight to the United States. In compliance with Lewy's directions, I have swallowed a half-milligram of melatonin on arising, as I will again tomorrow. But seated across from me in her spartan laboratory office at the University of Surrey is a scientist who firmly disagrees with Lewy's advice. "I think Al's much too cautious," says Josephine Arendt of her friend and colleague. "I don't think a half-milligram has much effect. I'd recommend five milligrams on the day of departure. I know why he's doing it, though. People are usually dashing around running errands and things on

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the day they leave. And five milligrams makes about 10 percent of people feel very draggy."

Arendt is a genial woman who clearly enjoys her work. She sometimes wears a T-shirt with a melatonin molecule on the front, and she keeps two of her passport photographs on her bulletin board: one from 1985 and one from 1995. "So much for the antiaging effects of melatonin," she smiles.

Arendt began giving melatonin to humans in the 1980s, after studying its effect on sheep. In the best tradition of old-fashioned science, she chose herself as her first subject, secure in the knowledge—based on studies of melatonin as a treatment for Parkinson's patients—that it was safe. In 1983 she published a scientific paper suggesting that, based on animal evidence, the hormone might be used to reset the human body clock. "Let us say," she says with a twinkle, "that the idea was greeted with a certain amount of disbelief." In 1985 she published the results of experiments that supported the notion, but that paper, too, was greeted with skepticism. Nevertheless, she persevered, curious to see if melatonin could be used to prevent jet lag.

"Our first efforts were a bit unorthodox," she says. "We advertised in the *Financial Times* for sponsors. British Caledonian Airways agreed to donate round-trip tickets from London to San Francisco, and the Grand Metro Hotels offered to donate rooms. We managed to obtain a $20,000 grant. Then we sent 17 quite willing, mostly middle-aged volunteers off to your West Coast where, poor lambs, they were forced to stay a fortnight in order to adjust to San Francisco time before returning to beautiful Surrey.

"Eight of them received melatonin and nine a harmless placebo, given on the eastbound return trip for three days before leaving and four days after arrival in London, a total of seven days. They wore wrist actigraphs that monitored their activity levels; we collected their urine to measure for hormonal levels, and we had them self-rate their sleep quality and mood. I sent my husband with them, but I stayed here to pull the strings and harass them the moment they stepped off the plane.

"The results were very pleasing. By every measure, the melatonin group had significantly less jet lag and of shorter duration than the controls. They reported that they slept better, and that they were much more alert. Seven days after arrival, we asked them to rate their jet lag on a scale of 1 to 100. Six of the placebo group rated theirs higher than 50. The eight melatonin takers rated theirs from 2 to 17."

It is noon in the shadow of the cavernous wind tunnel at NASA's Ames Research Center south of San Francisco. Mark Rosekind, of the NASA Fatigue Countermeasures Program, greets me amiably and gestures around his office. "Our program doesn't have a laboratory," he grins. "We do field studies in the real world. Our laboratory is at 41,000 feet."

Under Congressional mandate, NASA has been investigating jet lag and its possible effects on airline crews and passenger safety since 1980. Research has focused on the interaction between jet lag and simple loss of sleep. "Fatigue is a combination of sleep loss, upsets of the circadian clock and the flight operations schedule," Rosekind says of the studies. "It's difficult to distinguish how much of what we feel after a long flight is due to crossing time zones and how much is sleep deprivation," Lewy had told me earlier. "After all, what happens before you start off on a long trip? You probably stay up late packing, maybe cleaning the house, then you probably start early for the airport. And not many of us sleep well on planes. If our eyes close for a few hours, we're lucky. And the atmosphere in the cabin is dehydrating, they keep serving you food and alcohol and caffeine, you don't get any exercise. So when you drag around Amsterdam, who can say it's all because your clock is out of sync?"

In one experiment, NASA researchers wired pilots on the three-person 747 flight decks of two major airlines to measure their brain waves during flight. Among other things, they recorded what Rosekind calls "microsleeps," his head bobbing quickly and then righting itself to demonstrate. Without adjusting the data for individual differences, the patterns showed that crew members nodded or closed their eyes briefly an average of ten times per crew during the last 90 minutes of a long flight, including two during the critical period of descent and landing. When NASA prescribed

You've got jet lag licked if you sleep well after reaching your destination.

40-minute naps for each pilot during flight, they recorded an average of only two microsleeps per crew during the last 90 minutes and none during descent and landing. While this procedure has not been sanctioned for U.S. airlines, in-flight naps for three-person long-distance crews have since been adopted by six major foreign airlines.

NASA also advises pilots that both jet lag and fatigue can be reduced by two nights of sound sleep before departure or during stopovers. "If I were to extrapolate for passengers what we've learned from pilots," Rosekind says, "I'd say, get a couple of good nights' sleep, and take short naps on the plane. After arrival, follow a good sleep schedule and learn how to use bright lights and caffeine strategically. And don't go to important meetings or make important decisions as soon as you arrive."

"Not all the questions have been answered and the mysteries solved," Arendt had told me earlier. One of the questions is the link, if any, between food intake and jet lag. Several years ago, a researcher at the Argonne National Laboratory in Illinois developed an anti-jet-lag diet that President Ronald Reagan, among others, followed. The diet consisted mainly of alternating between high-protein and high-carbohydrate meals as a way to manipulate sleep cycles. Unfortunately, at least one major study of the program found it had no effect on jet lag.

It is 11 A.M. in California. I have been home for three days, feel bright-eyed and alert, and am back on my regular schedule. Yesterday I took my last three milligrams of melatonin. I call Lewy to report. In London I managed to follow the local clock, but I confess to some mid-afternoon droopiness and some 3 A.M. wakenings. At one particularly alarming moment, I felt myself nodding over the Indian curry, but I managed to fight it off. The second day after our return, I had faded a bit in mid-afternoon but managed to stay awake until my normal bedtime. Also, the melatonin had triggered some vivid dreams, as Lewy had warned it might. On Arendt's 1-100 scale, I calculated my jet lag was somewhere around 15.

Meanwhile, my wife—in spite of being female, an extrovert and a night owl, and thus presumably less vulnerable—had been unable to conquer drowsiness the second day in London and had succumbed to a long nap at 3 P.M.

Lewy reminds me that he had never predicted a complete cure. The results of my trial, we agree, are encouraging but not conclusive. Obviously more research is needed. This summer we are invited to Helsinki again, and this time I hope to eat the reindeer stew.

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By James R. Chiles

Bang! went the doors of every bank in America

Cashless, we carried on with nothing to fear but fear itself; by the time FDR opened them again, something called the New Deal was hard upon us

On March 1, 1933, Mark Massey had everything he needed for a profitable day: a plan, a gun and a bank to rob. The one he had his eye on was the Community Bank of Arkadelphia, Arkansas. Small-town banks had been easy pickings for daylight robbers all through the late '20s and early '30s. Lurking in the woods on the edge of town, he probably felt sure this stickup would be a piece of cake.

What Massey didn't plan on was a scene right out of *It's a Wonderful Life*: a bank jammed with desperate depositors trying to get their money out. Earlier that day, the bank's managers had taken advantage of a new state law designed to save banks from ruin by limiting withdrawals. Now wild-eyed Arkadelphians were trying to withdraw what cash they could. There were so many people, Massey couldn't cover them all with his gun, so he tried to herd the whole crowd into the bank's washroom—and failed. One customer slipped out and brought back the sheriff. "I never got a break in my life," Massey later complained from the hoosegow.

That day bank customers all over America were feeling pretty much like Massey. In Michigan two weeks before, the governor had shut down his state's banks to head off a likely financial collapse in the city of Detroit. A shock wave of raw panic had spread outward from the

As the banking crisis grew, scared depositors (here, in New York City) mobbed banks all across the country.

A 1933 cartoon blamed zealous bank examiners for the credit shortage.

Treasury Secretary William Woodin directed plan to revive American banks.

nation's industrial center. The country had become more or less used to bank closings; there had been 10,000 or so during the previous decade. But now all that looked like some sort of slow-fused warm-up. Even the flimsiest rumor was enough to set off a killing run on the strongest bank; the final banking explosion seemed, and in fact was, only days away.

In our era of wall-to-wall credit cards and guarantees that protect depositors, it's hard to convey the sheer panic that a nationwide bank run could cause in a time with none of those supports. In impact on the national psyche, the recent savings and loan scandals do not compare. In 1933 a depositor would lose as much as half of his life savings if other customers got to tellers' windows first and the bank ran out of cash and had to close its doors. Runs led to forced liquidations that made banks dump assets onto a market already crumpling under the weight of unwanted stocks, bonds and real estate. The U.S. Secret Service had just formed a "rumor patrol"; its purpose was to investigate all seditious whispers and sternly warn citizens that bad-mouthing a bank was a felony offense.

Major banks tried to hold the line. But by March 1933, even the huge banks of New York and Chicago couldn't resist the pressure. Two days after Mark Massey's aborted bank robbery, state and local government funds were tied up in dozens of closed banks. March 3, as it happened, was also the day before the inauguration of a new President, Franklin Delano Roosevelt. "Action, and action now," he had promised during his 1932 campaign against Herbert Hoover. Driven by a national crisis, he was about to make history by telling millions of Americans via the magic voice of radio, that "the only thing we have to fear is fear itself." He was about to close the nation's banks—all 18,000 of them—and that was only the beginning. The country was a third of the way into the Great Depression, an event that still casts a shadow over America's fiscal policies and collective conscience. After FDR got through, the country's financial system would never be the same again.

For starters, during seven historic days, Americans found themselves trying to get by without benefit of cash, credit or confidence in the stability of their country's currency.

The sudden lack of cash proved an astonishment; newspapers were soon reveling in stories of a nation with its pockets turned inside out. In a throwback to the days of wampum, a Rexall drugstore in California painted clamshells with coin denominations and used them as change. A Detroit department store offered three suits, three pairs of shoes and a dress in exchange for a 500-pound hog. Bootleggers in Toledo announced they would accept substitute currency being printed by the city. Airline companies (there were only a handful) optimistically suggested that travelers without cash could ship themselves C.O.D. and rely on relatives at the other end to pay the freight. The country was delighted to hear that John D. Rockefeller couldn't pay his servants—something he always did in cash—and had to ask them to wait a few days. Iowa State Senator Ora Husted arrived at the state capital toting a side of pork and 12 dozen eggs with which to pay his bills.

Beginning with FDR's inauguration and winding up with the reopening of some banks on March 13, new Democrats at the U.S. Department of the Treasury were teamed up with holdovers from Herbert Hoover's administration to figure out a quick way to check the health of every bank in America. Said Raymond Moley, one of FDR's advisers, "We were just a bunch of men trying to save the banking system." In fact, they were about to help the country get round a crucial corner on the long road back to recovery from the 1929 crash.

The Great Depression had not looked so great when it began. To be sure, the drop in stock value after the October 1929 Wall Street crash was astonishing—a sum approaching the national cost of fighting World War I was lost to investors in a few weeks. But people with money in the market back then tended to be wealthy: there was nothing like the widespread investment of today. Besides, milk still arrived at the doorstep every morning in clean glass bottles; trains still ran on schedule. Banks opened as they always had, five weekdays plus Saturday

James Chiles recently wrote about the rowdy goings-on in the U.S. Congress during the early 1800s.

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morning. Within months political leaders announced brightly that the country was turning the corner; business was adjusting nicely. Financial panics in the past, after all, had usually come and gone once speculators had absorbed their losses.

This one stayed on. Now and then upticks in the market made hopes soar, but economic indicators kept tipping back to new record lows. Nobody could agree on why. Republicans claimed crashes always came because of the spendthrift politicians in Washington. In 1932 the government was running at a deficit of something like $2.7 million a day. Democrats piled all the blame they could on President Hoover. He had once been the most honored man in the world. His relief organization in postwar Europe had saved some 15 million people from starvation. "I wish we could make him President of the United States," FDR had said of Hoover in 1920. "There could not be a better one."

Now he was reviled by his countrymen. In 1932 Hoover had done what he could. He created the Reconstruction Finance Corporation, which would lend billions in pump-priming money to all sorts of enterprises, including banks. But it wasn't enough. Shantytowns of tin and wood kept spreading, and became "Hoovervilles." Homeless folk on park benches tried to keep warm with newspapers, known as "Hoover blankets." People laughed over the story of the hitchhiker who zoomed across the country in five days by displaying the sign, "Give me a lift or I'll vote for Hoover." Trying to find ways to end the Depression, Hoover often worked 18 hours at a stretch; during that time he lost 25 pounds and his hair turned white. But deficit financing was anathema to him as to most economists then; he was committed to free enterprise and self-help and the goal of a balanced budget, and the situation seemed to have outrun those remedies.

During the famous Bonus March of 1932, legions of veterans appealing to Hoover for help camped in Washington, a few with their kids in tow.

For months on end, every week brought new stories of suffering and fear. As early as April 1932, a quarter of rural Mississippi was up for auction. In the 1920s America's railroad companies had bought 1,300 locomotives a year. In 1932 they didn't buy a single one. By some estimates, one out of three willing American workers couldn't find a job. Out of the 14,000 residents of Donora, Pennsylvania, a steel town, exactly 277 had a job. Sawmill workers were making 5 cents an hour and were lucky to get it.

Within a year of the 1929 crash, a series of rural Midwestern banks failed, foreshadowing the spectacular collapse of the big, official-sounding but privately owned Bank of the United States. It closed two weeks before Christmas in 1930, trapping deposits from a half-million customers.

In these days of federally insured banks, Yuletide broadcasts showing Jimmy Stewart trying to save Bedford Falls from Lionel Barrymore are as close as we get to the infectious terror of a full-blown bank run, with frenzied depositors trying to yank out their savings all at once. Back then many banks were small and underfinanced, with no branches to draw on. It didn't take much to bring one down. Even bigger banks found it hard to handle runs because most of their money was spread around in loans that couldn't be quickly converted to cash. Runs on local banks usually lasted only a day or two, sometimes just hours, so a banker's best course was to get hold of as much cash as he could and try to slow down the processing of withdrawals, meanwhile reassuring customers that the bank would make it through the panic.

That wasn't so easy. The reputation of bankers, never exactly glowing, had been taking a terrible beating. A Minnesota Congressman, Francis Shoemaker, went to jail for calling one banker a robber of widows and orphans. The drunken president of a bank in the St. Louis suburbs pulled out a revolver and took a shot at an ex-

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aminer who had come to check over the books; the bank, it turned out, had strengthened its balance sheet with forged loans. Father Charles Coughlin, the radical radio priest, regularly accused "banksters" of robbing just about everybody. The government, he insisted, needed to nationalize all the banks. "Don't tell my mother what I'm doing," a banker in one Depression-era joke exclaimed. "She thinks I'm playing the piano in a sporting house."

Some banks favored an in-your-face show of confidence. During a run in Van Buren, Arkansas, a bank took to paying its depositors in silver coins: "Bring your own bag to take home the balance." After trying to drag away 50 pounds of savings, some customers gave up. Seeing a run looming, the First Security Bank of Boise, Idaho, hung a welcome sign over the door: "If You Want Your Money Come and Get it." Meanwhile, the bank urgently wired to Salt Lake City for $500,000 in cash. The run stopped before the cash arrived by plane.

Depositors sometimes reacted bizarrely to such ploys even after getting their money back. At Boise's First Security, one woman took out $75,000 in cash, then returned it the next day. "If you've got my money, I guess I really don't want it," another person standing in line told the teller. "But if you haven't got it, then by heaven, I want it now and in full!"

One draconian method was to get all the local banks to close at the same time—which required considerable courage and political cooperation. Faced with bank panic spilling over from Champaign, Illinois, the leaders of sister city Urbana got the town's bankers to agree to a shutdown. Only then did they find out that if a bank decided on its own to lock its doors, the state deemed this a "bank failure" and might move in, either to close the bank permanently or to drastically reorganize it. Then somebody realized that all banks close on legal holidays, and nobody complains about it. So on January 19, 1932, Urbana's mayor declared a five-day holiday. All the city's banks and most businesses were to close while teams of volunteers spread out to wrestle local depositors into signing a no-withdrawal pledge. It worked, and the term "bank holiday" became popular. The so-called Urbana Plan spread to other cities in Illinois and Iowa, but it wasn't always successful.

In any case, depositor pledges were only a stopgap; they didn't get to the real problem: lack of cash, lack of commerce and a galloping deficit in public confidence. It was a vicious circle. Loan payments to banks fell behind as Depression layoffs and wage cuts squeezed borrowers; when banks foreclosed, they found that collateral accepted before the crash—securities and houses alike—had plummeted in value. Nationally, banks were foreclosing on a thousand homes a day.

As 1933 dawned, many Americans felt that the banking crisis with all its

In *It's a Wonderful Life,* Jimmy Stewart quieted fears during a bank crisis.

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interconnected problems was part of a colossal national failure that perhaps could not be fixed without resorting to violence or dictatorship. Newspaper cartoonists called the enemy "General Depression," sketching it like a scraggly, sinister generalissimo. But if this was war, America seemed to be on the losing side. "I have no remedy in mind," the president of U.S. Steel told a Senate committee. Hitler was even then confirming his grip on Germany; American newspapers quoted Mussolini's suggestions that what America needed was a "lone guiding mind." Perhaps a violent uprising or dictatorship lay just around the corner.

Farmers came closest to fomenting a real revolution.

By 1932, people all through the farm belt were burning corn in their furnaces; it had become cheaper than coal. Missouri chicken farmers often got as little as 3 cents a dozen for their eggs. In January 1933, an Iowa farmer named August Weger sent five calves via rail to Chicago. Instead of a check he got back a bill for $1.98; the selling price of the livestock couldn't cover the cost of shipping and feed. But taxes and mortgage payments didn't drop with prices.

"Farmers are ready to do anything," the president of the Wisconsin Farmers' Union told a Senate committee. "I almost hate to express it, but I honestly believe that if some of them could buy airplanes, they would come down here to Washington to blow you fellows all up."

The toughest agricultural group was the Farmers' Holiday Association, led by firebrand Milo Reno, an ex-preacher who blamed everything on "Eastern interests and international bankers." Reno's forces began blocking highways that led to rural market towns, using spiked logs and backed by farmers toting wooden clubs and sometimes shotguns. They let cars through but turned back trucks carrying produce. After stopping a dairy truck in 1932, Holiday protesters in Iowa slathered butter over U.S. Highway 75; passing vehicles would hit the patch and slide smoothly into a ditch.

Law enforcement officials were helpless. Near Sioux City, Iowa, farmers easily took away the sheriff's badge and gun and tossed them into a cornfield. In Council Bluffs, Iowa, after dozens of men were arrested, a thousand farmers marched on the jail and got the prisoners out.

Farmers began shutting down foreclosure sales. In January 1933, a thousand angry farmers showed up in minus-22 weather at the sale of a farm near Willmar, Minnesota. The sale was postponed. Sometimes angry mobs of farmworkers simply took over. In those circumstances, sales often became penny auctions with the mob threatening violence to anyone who bid more than pocket change. At a sale

Clinging to the jagged rock,
Nick was comforted by
the knowledge that all he
had scheduled for tomorrow
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in Woodbury County, Iowa, neighbors helped things along by cutting the phone line and keeping bids from the audience down to a total of $11.75. Then they forced the holder of the mortgage to sign a note accepting that amount as settlement.

As it often does, violence seemed to work. By February 1933, many mortgage holders were backing off. Some states had even passed laws to suspend all farm and home foreclosures until conditions got better.

Halting foreclosures, however, hit the banks hard, because they couldn't collect on loans and were facing foreclosures of their own in the form of runs by depositors. Eventually banks found themselves stuck with millions of America's homes and farms, but there was nobody to sell them to.

What the farmers really wanted was for the government to artificially reverse the price decline. "Reflation, or revolution," was the cry. As Inauguration Day approached, Hoover wanted Roosevelt to promise that as President he would swear allegiance to the gold standard and balance the federal budget, figuring that would restore investor confidence. FDR refused. As he saw it, budget cutting and helping business with loans wasn't going to restore the country's confidence.

Though he did not save time as he might have by working with Hoover before the inauguration, his adviser Raymond Moley and his new Treasury Secretary designate, William Woodin, had already teamed up with Hoover's Treasury staff at the Federal Reserve Board. They were trying to convince the governors of Illinois and New York to close their banks by state action. Both did so; withdrawals from New York City banks had reached $440 million a week, a loss that could not long be sustained.

The gifted impresario of America's banking salvation proved to be the 64-year-old Woodin. A man of many parts, he had done day labor in a foundry after college, then headed for Europe to study musical composition. He also composed symphonies and children's songs in his spare time. Before becoming Secretary of the Treasury, he had been a successful manufacturer of railroad equipment and held directorships in 21 companies. Democrats trusted him because he had been one of FDR's early financial backers. The night before the inauguration, the National Symphony Orchestra performed his piece "On the Prairie" in Washington; Woodin was too deep in meetings with FDR at the Mayflower Hotel to go. He had forged a close friendship with Hoover's Assistant Secretary of the Treasury, Arthur Ballantine, who agreed to stay on and help out temporarily, on condition that nobody would be hired to fill Treasury Department posts without a joint say-so between Woodin and Ballantine. Woodin agreed.

On Saturday, March 4, in the last minutes before motoring off to be sworn in, FDR met with Woodin and agreed on what was to be done. In his inaugural speech it was the phrase about having nothing to fear but fear itself that lodged in the public memory.

Desperate Midwestern farmers, like these stopping a cattle truck in Sioux City, Iowa, tried to improve prices by keeping goods from the market.

The short-term cure Roosevelt proposed was to have banking—and debt—take a federal holiday all over America. The closings ordered were stricter than anything that most states had tried: rather than cutting back on withdrawals, FDR's proclamation cut them off almost entirely. Meanwhile, banks could accept deposits and could cash Treasury checks.

To justify this high-handed proclamation, FDR cited the "Trading with the Enemy Act." An old law, passed in 1917 as a wartime measure, it said nothing whatever about shutting down banks, but it did give the President the power to stop the export or hoarding of gold and currency in times of national emergency. This was quite a stretch, legally, but FDR figured the bank holiday idea would hold up if Congress immediately passed a law approving what he had done.

The great bank holiday began on Monday, March 6. Wealthy folk, particularly, had been predicting food riots and mass assaults on bank vaults. After all, they gloomed, during the draft riots of 1863, police had lost control of whole sections of New York City for days at a time. "Fearing a possible siege, many of us bought a great deal of canned food and stored it in our cellars," a resident of Muncie, Indiana, had recalled. "One family I know bought enough for more than five years."

But within a day, it was clear that something different was going on. After months of worrying about what

I stare at mountains in everything I see;

their echoes ring reminders

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What things I have seen in these

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In a sign of the times, a National Guardsman, called out to keep order, threatened an embattled farmer protesting a foreclosure.

other depositors were up to, most people welcomed rule by proclamation—and the national holiday as well. *Business Week* went so far as to tell its readers: ". . . a little to our astonishment we find that we are still here and that we can still eat and sleep and work and smile. We can deal with an open crisis; we could not fight a shadow."

Even staunch Republican newspapers, perhaps inspired by a few moves by FDR to cut federal spending, raved about his first days in office. "Honor to President Roosevelt who, more than any man, is responsible for the wondrous change in the nation's outlook and its prospects!" said the Hearst's *New York American*. FDR was showing "bald courage and unselfish leadership," said the *Boston Transcript*. Even *The Chicago Daily Tribune*, which shortly before had been blaming the whole Depression on Democrats in general and excess government spending in particular, joined the chorus.

Only a three-day closing had been planned, but FDR's emergency banking bill provided that it could last as long as necessary. A survey by a Massachusetts newspaper showed the average family had $18.23 in cash on hand when the banks closed. People began raiding their children's piggy banks and dusting off coin collections. Hoarders dug around in attics and rolltop desks for gold and silver coins and old, oversize bills that had been out of circulation for years.

Travelers caught away from home had to hunt up friends for meals, a loan or a place to sleep. The papers were full of stories about how FDR's bank holiday was bulldozing through class distinctions. Executives of one New York corporation hocked their jewelry and watches to raise $3,000; then each employee, from the company president to the shipping clerk, was given exactly $10 to live on. Finding himself in need of bus fare to Connecticut, a New York banker ended up borrowing it from a newsboy.

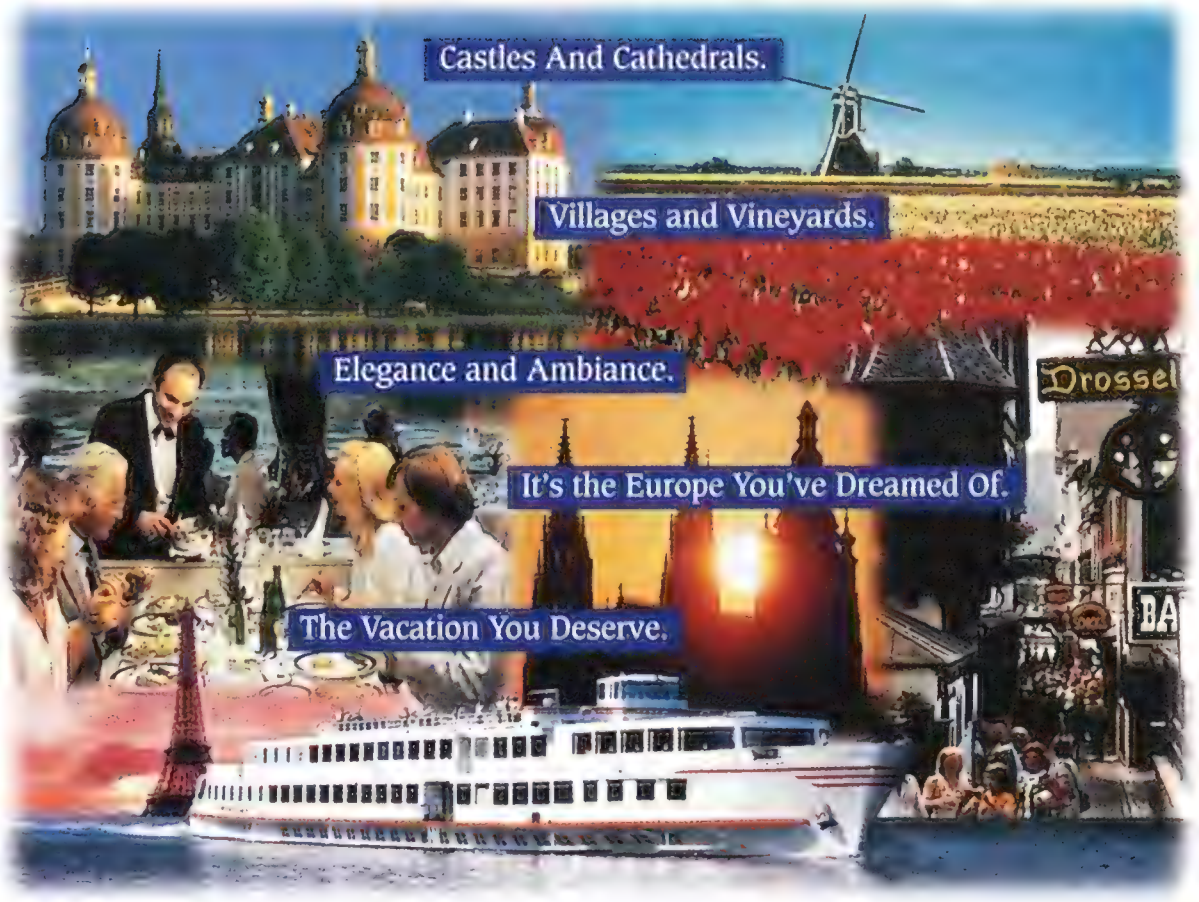
People who had managed to cash out their deposits in large bills before the holiday found that change was in such short supply, businesses wouldn't accept fifties, twenties or even five-dollar bills for small purchases. After a

customer offered up a five-dollar bill for a 75-cent meal in western Arkansas, the waitress told him, "The meal is on us and don't bring five-dollar bills around here." The Commodore Hotel in New York sent a messenger around to nearby churches to exchange big bills for the change in their collection plates. Roseland, a famous Manhattan dance hall that charged 10 cents for a turn around the floor, accepted IOUs from customers—but only if they could produce a bankbook.

Barter produced the best bank holiday stories. Stopped for a traffic violation in Stuttgart, Arkansas, a truck driver paid his fine with two bags of rice and drove on. Ten bushels of wheat bought a year's subscription to the Lewistown, Montana, *Democrat-News*. Ticket sales at movie theaters fell to half their preholiday levels and Hollywood studios shut down. The Minneapolis Symphony gave free concerts; in Chicago you could get to see the Irish Players for a couple of new potatoes. "I see no reason why there should not be a new theatrical season," deadpanned Robert Benchley, "providing my proposed plan for using pressed figs and dates as money goes into effect fairly soon."

The *New York Daily News* sponsored a

Lampooned President Hoover looks smug and fat as Bonus Marchers pass.



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boxing tournament and advertised admission on a barter basis. The normal price was 50 cents; by the time the sluggers got under way, the organizers had issued tickets in return for false teeth, golf knickers, mattresses, spark plugs, baseball bats, balls, Bibles, underwear and jigsaw puzzles. Swappable food offerings included salami, franks and a big box of egg noodles.

This holiday atmosphere couldn't last, especially in cities like Detroit, which had already been bankless for four weeks before FDR's holiday started. Out of 1,400 city employees there, a thousand couldn't cash their checks. After some people fainted on the job from hunger, Detroit put municipal employees on welfare rolls so they could draw on whatever federal cash had escaped the bank closures. "Everybody's broke," merchants reported. Stores had bountiful collections of IOUs and uncashed checks, but no money to pay wholesalers.

Before it could lift the holiday, FDR's brand-new administration had to answer two questions: Which banks were sound enough to reopen? And what would the reopened ones use for money in case panicking depositors showed up to pull out their savings?

On the first problem, Woodin decided to dispatch a legion of federal and state bank examiners charged with sorting the nation's banks into three groups: class A banks could open the week beginning March 13; class B needed some changes first; class C would be closed for good. With 18,000 banks to check, Woodin's examiners were given just five days to do the job.

New Yorker cover, which did not run, zapped both glum Hoover and toothy FDR in latter's inaugural parade.

Because the federal government was nearly out of cash itself, it couldn't ease the cash shortage by lending banks its own money. Bankers at first favored creating a torrent of scrip, such as was already circulating in a few cities like Nashville and Atlanta. New York banks quickly ordered $250 million in multicolored "emergency certificates." Scrip was essentially a set of printed IOUs handed out by someone who promised to redeem them for cash after the emergency. The issuer might be a county government, a local industry that paid workers with it, or a hotel like the posh Huntington in Pasadena, California. The rich and famous staying there—the former Speaker of the House, a princess from Denmark, East Coast bankers—lined up to get their share of $2,000 worth of scrip to pay for meals, shoeshines, cigars and tips.

Apart from paper, ersatz cash took some odd forms. There were magnesium coins in Michigan and plywood rectangles in Tenino, Washington. Four merchants in Clear Lake, Iowa, opened a Corn Bank that issued 25 cents' worth of scrip per bushel for thousands of bushels of corn that farmers obligingly dumped into giant cribs set up on city streets.

But Woodin decided that using scrip nationwide would cause more problems than it solved, mainly because a national economy couldn't cope with hundreds of currencies of uncertain worth. It was he who arranged for the federal government to print up a great many more Federal Reserve Bank Notes. This was a federal currency guaranteed by the government, but by

A stern and purposeful Franklin Roosevelt signed the Dollar Devaluation Bill, one of the new laws that ended banking woes and started the New Deal.

the time Woodin and Roosevelt were through, the notes would not be backed by gold or silver as had been the case before. To get Federal Reserve Bank Notes, banks had to put up their own assets.

On Thursday, March 9, four days into the national holiday, Congress swiftly passed an emergency bill to prepare for reopening the banks. "The house is burning down, and the President of the United States says this is the way to put out the fire," said House Republican floor leader Bertrand Snell. The measure moved so fast that Representatives didn't even wait to look at a printed copy before voting. Roosevelt signed the bill in the White House the same night, in a library still cluttered with unshelved books and unhung pictures from the move-in. Next day the Bureau of Engraving began cranking out $2 billion in new banknotes—fives, tens, twenties, fifties, hundreds. The cash began arriving by the planeload at 12 Federal Reserve banks around the country. Roosevelt explained the bank crisis—and how he proposed to set things right—to 60 million radio listeners.

"Mr. Roosevelt stepped to the microphone last night and knocked another home run," said Will Rogers the next day. "He made everybody understand it, even the bankers."

In what surely ranks as the most abrupt reversal of opinion in this century, Americans responded to the lifting of the bank holiday not by pulling the new currency out of banks but by

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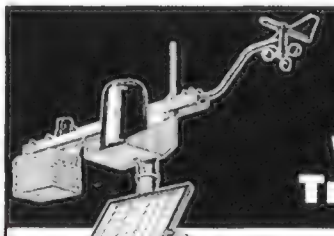

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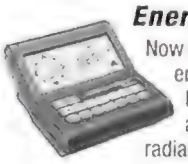

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dumping what hoarded money they had back in. By the end of that first day most of the nation's banks were running again; in New York, all but nine had reopened. The New York Stock Exchange took one of the biggest price jumps in its history. Shoppers returned to stores in a rush. The federal government issued a new series of Treasury Certificates and found more buyers for them than it could handle.

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Book Reviews

Savages
Joe Kane
Knopf, $25

The death of a rain forest is one of those tragedies we know about as news, but we don't mourn such news the way we mourn the death of a friend. Even the most haunting visual images of slashed-and-burned wastelands or oil-blackened rivers in the jungle tend to shock the eyes but numb the heart. It is one of the paradoxes of modern global media, such as television, that the more they make us aware of our world, the less intimate that awareness becomes.

Joe Kane is a writer with the sense to know that tragedy without intimacy is mere information and with the skill to show us the loss of a rain forest as the loss of many friends. In *Savages* he takes us with him into the heart of the Ecuadorian rain forest, in a quest to understand the people who live there. His portrait of the Huaorani (pronounced wow-rah-NEE) as they face destruction by the operations of an American oil company is as gripping as a Conrad novel, full of strong characters and wild landscapes. Some literary critics believe that the traditional novel is being replaced by what they have called the nonfiction novel; if so, Joe Kane's *Savages* is a classic example of the genre.

Kane was working for an environmental organization, the Rainforest Action Network, when the Huaorani became the center of a political dispute: in a petition to the Inter-American Commission on Human Rights, the Sierra Club Legal Defense Fund charged that oil drilling on Huaorani land

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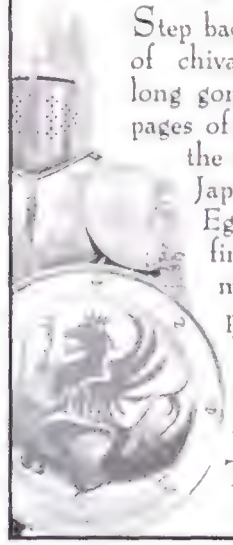

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would be ethnocide, "that for the sake of enough oil to meet U.S. energy needs for thirteen days, the Huaorani way of life would be destroyed." Other environmental groups were trying to work out deals on behalf of the Huaorani and fighting among themselves for control of funds the oil companies might set aside to help the tribe. Still other interests, including missionaries, politicians and land-hungry colonists, were pressing for access to the Huaorani heartland. But, with the exception of a few individuals, none of these groups had ever in fact met the Huaorani face-to-face. "For all the ruckus being raised," Kane writes, "no one knew what the Huaorani wanted. No one really knew who the Huaorani were."

Kane left his job and went to Ecuador to find out. He first met a few leaders in the town of Coca. Then, despite threats from a local military commander who denied him permission to visit the Huaorani interior, he slipped past an army checkpoint into the jungle in a truck loaded with Huaoranis who were hanging from the sides and piled on top of him. In his very first encounter with them, Kane caught the spirit of a people trying to grasp the modern world in terms of the ancient forest. At a Coca hotel he met Amo and Enqueri:

> [Enqueri] had hardly any teeth at all, and he was wearing a pair of headphones that appeared to be plugged into his right hip pocket. When I asked him what he was listening to, he replied in a tone so solemn I was sure I had committed a horrible breach of Huaorani etiquette. "I am listening," he said, "to my pants." He let that hang for a moment, and then he and Amo collapsed with laughter, rolling on the ground and cackling wildly.
>
> "To your pants!" Amo gasped. "What do they say?" "They say, 'Wash me, you moron!'"

With them was a young warrior named Moi, who seemed to have the clearest vision of his tribe's impending fate. The Huaorani had elected these men to protect their way of life from the Company (a name they used for all the oil companies and their various allies). But they had no office, no phone and no money. When Kane asked what they proposed to do, Moi answered softly, "We will find the Company and talk to them. If they do not listen, we will attack with spears from all sides."

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Kane spent the better part of two years with the Huaorani, visiting their villages and taking an apartment in Quito, where they visited him from time to time. He shared their way of life and began to understand it. At first the jungle was an ordeal he would barely survive: "Enqueri announced that we would walk until 'five minutes after five.' This puzzled me—it was true that he wore a watch, but it didn't work. In any case we walked for perhaps ten hours, during which I fell, slid, and stumbled and got stung, bit, and branch-whipped so often that by the time Enqueri announced, 'Five minutes after five,' I had no idea of direction or distance, of where we were or even where we were going."

A year or so later he could see things differently, in the company of a Huaorani elder named Mengatohue: "Walking in the forest with him was like visiting an immense library with a master librarian. No matter how seemingly wild, every patch of ground had a history. Here he had planted chonta palm that in the time of Moi's children would provide wood for spears. Here balsa had reclaimed an old manioc garden and would be harvested for earplugs and rafts. Here a man had been spear-killed; here a jaguar appeared now and then. Here were plants for treating snakebite, diarrhea, skin rash. Here a patch of the hallucinogen ayahuasca that would soon be ready to brew into tea. I began to see the forest not as wild and unknown but as managed and inventoried, shaped and maintained by man as much as it shaped and maintained him."

This was the forest Kane and the Huaorani saw being destroyed by dynamite, bulldozers, helicopters, barbed wire and oil—spilled into the rivers and poisoning the earth until some areas looked like "one big toxic sponge"—while missionary-run schools invaded their villages, destroying their language, culture and way of life. When Kane encountered them, in the early 1990s, a generation of Huaorani had already been to such schools and had some experience working for the Company, but the young men like Moi and Amo and Enqueri were trying to use that experience to save their villages and values. What they were seeking, Kane learned, was "a Huaorani synthesis: a traditional way of living enhanced by certain modern tools that offered access to an *abun-*

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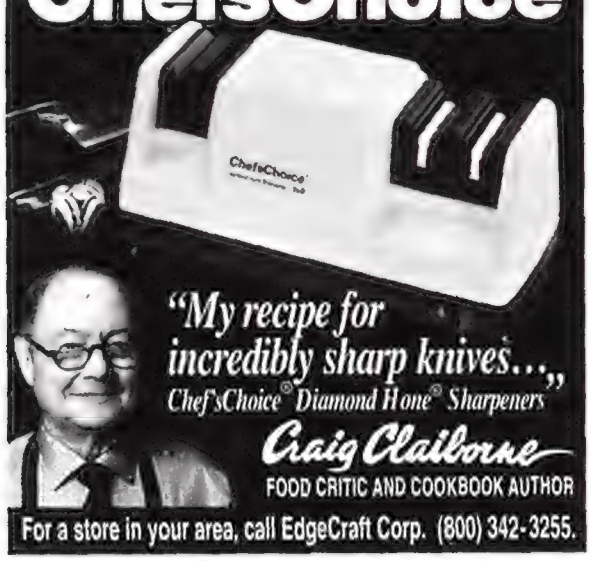

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dancia not found in the forest and on which, increasingly, they had come to depend." Paradoxically, one of the most important of those tools was literacy. The Huaorani had found that delivering a written demand to the Company, "particularly when it . . . invoked threats of violence and when the authors appeared in person brandishing spears," often produced a host of goods—tools, food, radios, boots and the like. Literacy, Kane observed, raised the traditional Huaorani practice of hunting and gathering to an entirely new level.

As Kane watched, however, neither spears nor literacy could keep the Company out of the Huaorani forests. One tribal leader was mysteriously assassinated, another seduced by bribes, and with the help of some anthropologists and missionaries, oil executives organized new elections and lavish ceremonies to legitimize their juggernaut. On a visit to Coca, Kane talked to a veteran Capuchin monk who posed this question: "When the Huaorani kill, there is a spiritual discipline to it. Americans kill without knowing they are doing it. You don't *want* to know you are doing it. And yet you are going to destroy an entire way of life. So you tell me: Who are the savages?"

After Kane returned to the United States, he saw Moi one more time, in Washington, D.C. The Huaorani warrior came to talk to the diplomats on the Inter-American Commission on Human Rights, who applauded him but offered no help. Moi carried a letter inviting the President of the United States to visit the Huaorani, and telling him, "We do not want to be civilized by your missionaries or killed by your oil companies." Wearing a crown of bird feathers made from owl, eagle, toucan, parrot and wild turkey, Moi went to the White House gate to deliver his letter. But the gate was closed, and Kane barely dissuaded him from climbing over it. ("I will climb the trees and hide," Moi argued. "I will pretend I am hunting monkeys.") Moi returned to his rain forest, less a hero than a tragic figure, going home to take up spears against the Company.

Several months after Moi's journey to Washington, the first pipeline on Huaorani land was opened. Disaster ensued almost instantly: at a bend in the river where Kane often had canoed with his Huaorani companions, another pipeline ruptured, dumping so much oil

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"But that was nothing," Kane writes, to "what happened a few months earlier, in the same place: One of the wells in the Cononaco field burst into flame and burned out of control for nearly a week. It was, by most accounts, the biggest fire ever seen in the Oriente [region]. The oil-fed flames were said to have leaped so high that they dwarfed the great forest itself, and to have spread so fast that no man could outrun them."

Kane also draws lucid portraits of the oil executives, missionaries and environmentalists who the Huaorani speak of, collectively, as *cowode*, their word for cannibals. And through Kane's eyes, we can see Moi and the Huaorani's fate as a tragedy in which we have all indeed played a part.

Paul Trachtman is a reviewer living in rural New Mexico.

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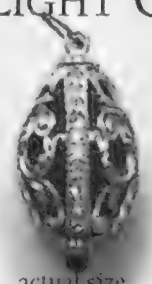

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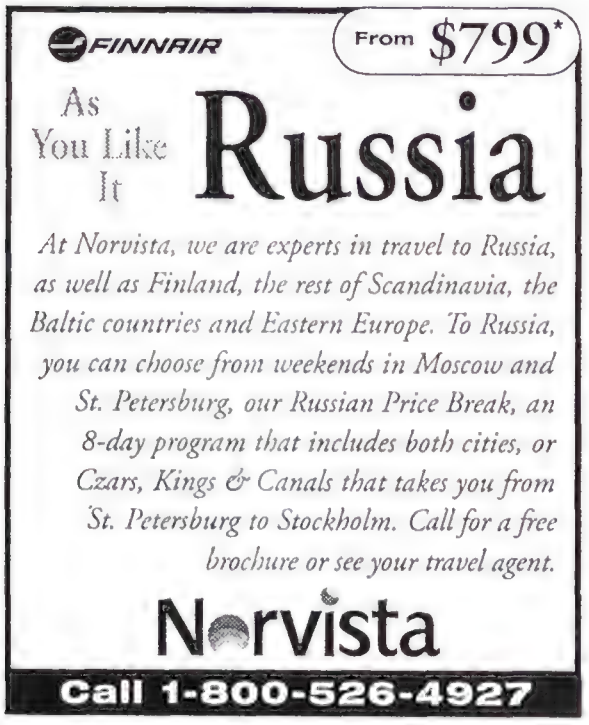
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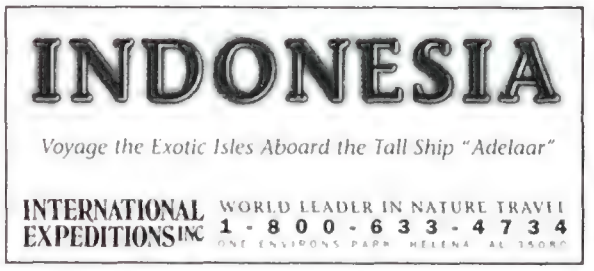

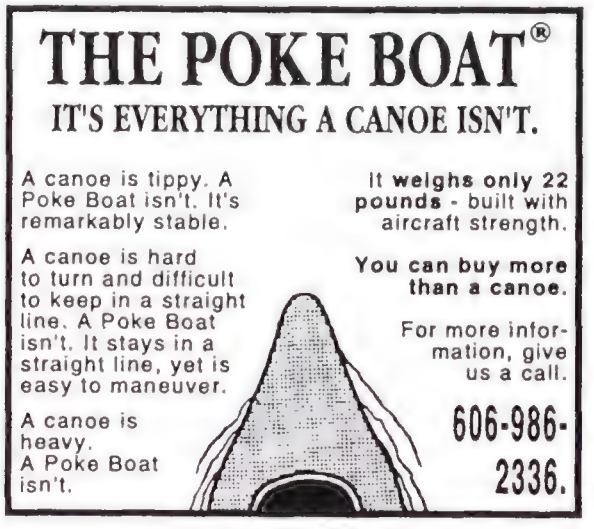
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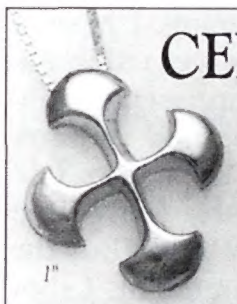

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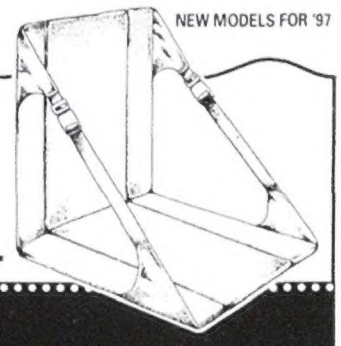

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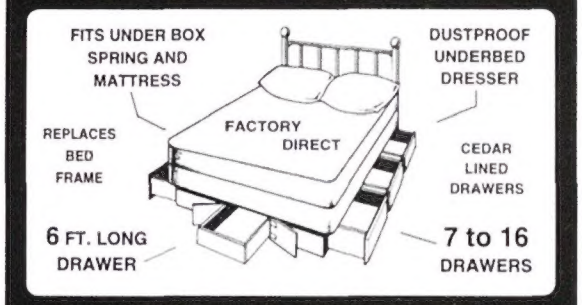

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By Jonathan Sapers

If you've always been a hacker, why would you want to be like Mike?

There are two kinds of people in the world: those who play sports and those who excel at sports. The men I know who belong to the former group keep trying to join the latter group. We're unable to relinquish the fond hope that one day our aging limbs will miraculously become well coordinated.

Take me, for example. I play basketball. I know I stink but I can't stop. I've been bad for years. In grammar school, I actually went the wrong way on the court and took a shot at the wrong basket. (It didn't go in.) In high school, I was the sixth man on a five-man team. If any of the starters had gone down, they would have forfeited the game rather than put me in. In college, I played regular pickup games with an oddball assortment of varsity football and lacrosse players and once broke my right index finger; I think I stepped on it. I'm now nearly 35 years old and play with a group of over-40 lawyers on Thursday nights.

Basketball is the ultimate hacker sport. I can rebound and I can score occasionally, but I am basically a body in the lane, the preferred hacker position. It is possible to have a career in the hacking game. The injuries you get are minor: broken noses, turned ankles, jammed fingers. Real athletes—and some of them do condescend to join us from time to time—always seem to have serious injuries. The two real athletes who play with us have injuries that are whispered about. Something's wrong with their Achilles tendon, or their eye sockets or their calf muscles—something serious, we're not quite sure what.

A hacker can get away with the most outrageous bonehead plays merely because he is conforming to expectations. I seem to have a predilection for behind-the-back buffoonery. I once tried a behind-the-back pass that (surprise!) ended up in the hands of a kibitzer on the sidelines. Another time I got the ball down the court, jumped up uselessly and executed a nifty behind-the-back pass to no one.

Until recently, I was reconciled, more or less, to being mediocre for life. Then my wife, Cristine, put the two of us on a fast-walking routine, and I started playing tennis every day. Suddenly, my hand-eye coordination got better and my legs got stronger. "I bet this will help your basketball game," said Cristine.

She was right. I began to show flashes of real talent. I acquired a feel for the game I never had before. I made the right moves without thinking about them. I developed a shooter's touch. In one game, I took three consecutive shots from beyond the three-point line and got nothing but net each time. Even before the last one went in, I turned and started running nonchalantly back up court. Hey. Be like Mike.

I'll never forget my best game. That feeling of being in what players call a "zone" started almost immediately. I had the ball to the right of the key with my back to the basket. Long Arms was covering me. I tried a hook shot. I heaved the ball against the backboard rather than arching it, but it went in. Everyone laughed, including me.

I went back on defense and Long Arms tried to take me down low. I blocked his shot. He tried another one and I blocked that one, too. "I didn't think you'd get it," he said.

On offense again, I found myself leading the break, dribbling. I hesitated. When you're over six feet tall in the hack game, you're not supposed to handle the ball. You're supposed to know your place, and your place is down low. I dutifully passed off, maneuvered into the key and scored off a feed. But the next time down, I felt confident. I shot off the dribble without hesitation and the ball swished in. Someone shouted, "Trash!" It was the ultimate compliment—or at least I thought it was until the end of the game, when Corner Shooter asked me if I'd been to basketball camp over the summer.

The next game started out the same way. I pulled down a rebound and hit a turn-around jumper. A pass came to my man to the right of the key. I dove for it but I didn't get it. Something gave in my left calf. I went down, and when I got up, I couldn't walk. Someone took my place. Corner Shooter brought me some ice. I had never had anyone bring me ice before. "You probably tore it," said Athlete One. I was thrilled. At last, a serious injury.

I was out for two weeks, and during that time all I could do was worry about whether I still had it. For my return, I sported an ace bandage wrapped conspicuously around my calf. Corner Shooter was impressed. "Nice," he said.

Back in my customary place down low, I felt good. Nothing had changed. The basket was mine. Less mobile New Guy edged into my territory. I was going to take him—but I dropped the ball. A moment later, *Bang!* I reverberated off New Guy's pick like a gonged cartoon character. I decided it was time to make my move. I loped down the court like a gazelle and lofted a shot. Air ball. "That was a pass," I joked.

Humbled, I fought for a rebound under the basket and went up for the easy putback. No problem. *Clank!* It banged off the rim.

So I stink again. Actually, I'm kind of relieved. I'm a hacker. Who can argue with destiny? Besides, I discovered early on in my temporary transformation that excellence isn't all it's cracked up to be. There's too much pressure.

Be like Mike? No thanks. I'd rather be like me.

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